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LABOULBENIOMYCETES (ASCOMYCOTINA) IN THAILAND, I

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ABSTRACT

Thirty species of the Laboulbeniomycetes in Thailand are treated here. These fungus species, all exoparasites, of insects, belong to eight genera: *Autoicomlces*, *Chitomyces*, *Dimeromyces*, *Enathromyces*, *Laboulbenia*, *Rhynchophoromyces*, *Rickia*, and *Zodiomyces*. Descriptions of all species of the Laboulbeniomycetes collected in this country, including their host insects and distribution, are given.

INTRODUCTION

The Class Laboulbeniomycetes is a highly specialized fungus group of the Subdivision Ascomycotina. All species of this fungus group are exoparasites of the Arthropoda, especially insects. Members of the Laboulbeniomycetes are widely distributed throughout the world and the richest floras of this fungus group are found in tropical regions. However, no species of the Laboulbeniomycetes has been reported from Thailand.

In March, 1982, the authors collected about 15,000 insects in Thailand and examined them as well as about 10,000 insect specimens in the collection of the Forest Pest Control Subdivision, Royal Forest Department, Bangkok. Among these insects, the authors found about 150 individuals parasitised by the Laboulbeniomycetes. The host insects belong to five families of the Coleoptera, Carabidae, Chrysomelidae, Dytiscidae, Endomychidae, Hydrophilidae and Tenebrionidae, and one family of the Diptera, Agromyzidae. The fungi of the Laboulbeniomycetes found on these insects include 30 species belonging to eight genera. The fungus genera are *Autoicomyces*, *Chitonomyces*, *Dimeromyces*, *Enathromyces*, *Laboulbenia*, *Rhynchophoromyces*, *Rickia*, and *Zodiomyces*. The species under these genera are as follows:

Genus *Autoicomyces* Thaxter: *A. falcifer* Thaxter, *A. herocharalis* Thaxter and *A. siamensis* sp. nov.

Genus *Chitonomyces* Peyritsch : *C. bakeri* Thaxter. *C. chinensis* Thaxter, *C. chungii* Thaxter, *C. japanensis* Thaxter, *C. javanicus* Thaxter *C. mauubriolatus* Thaxter, *C. ordinatus* Thaxter, *C. paradoxus* (Peyritsch) Thaxter, *C. rugosus* Thaxte, *C. thaxteri* Spegazzini, *C. zonatus* Thaxter.

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Genus *Dimeromyces* Thaxter: *D. cherrhonesites* Balazuc, *D. oscinosomalis* Thaxter.

Genus *Enathromyces* Thaxter : *E. indicus* Thaxter.

Genus *Laboulbenia* Peyritsch : *L. anoplogenii* Thaxter, *L. catascopi* Thaxter, *L. celestialis* Thaxter, *L. idiostoma* Thaxter, *L. kunckelii* (Giard) Thaxter, *L. morionis* Thaxter, *L. pheropsophi* Thaxter, *L. proliferans* Thaxter, and *L. tachys* Thaxter.

Genus *Rickia* Thaxter : *R. eumorphi* Thaxter.

Genus *Rhynchophoromyces* Thaxter : *R. denticulatus* Thaxter and *R. rostratus* Thaxter.

Genus *Zodiomyces* Thaxter : *Z. subseriatus* Thaxter.

The present paper includes descriptions of all species of the Laboulbeniomycetes collected in Thailand, their host insects and distribution.

DESCRIPTIONS OF SPECIES

1. Autoicomyces falcifer (Thaxter) Thaxter, *Mem. Amer. Acad. Arts Sci.* **13** : 435 (1908) et **16** : 357 (1931). SUGIYAMA & SHAZAWA. *Trans. mycol. Soc. Japan* **18** : 220 (1977). (Fig. 2, D).

Ceratomyces falcifer Thaxter, *Proc. Amer. Acad. Arts Sci.* **41** : 318 (1905).

Autoicomyces japonicus Thaxter, *Mem. Amer. Acad. Arts Sci.* **16** : 359 (1931). SUGIYAMA, *Ginkgoana* **2** : 18 (1973).

Total length to the tip of perithecium exclusive of the apical projection, 205 μm long. 80 μm thick. Thallus hyaline, uniformly yellowish, partly darkened, consisting of a receptacle and a perithecium. Receptacle cylindrical, hyaline, consisting of the basal and distal portions, 95 μm long, 70 μm thick; the basal portion gradually tapering towards the basal end, forming the stalk portion of the thallus, forming an obconical foot at the basal end, comprising 3 one-cell layers, 62 μm long, 30 μm thick; the distal portion darker than the basal portion, free from the perithecium except for the basal part, tapering towards the distal and, 112 μm long, 27 μm thick. Perithecium consisting of perithecium proper and a perithecial projection; perithecium proper ellipsoidal, more strongly convexed at the anterior side, broadly suffused with brown, with 7–8 visible layers of wall-cells, bearing a long projection at the posterior side of subapical portion, 110 μm long, 60 μm thick; perithecial projection hyaline, cylindrical, sickle-shaped, tapering towards the distal end. Antheridium not observed.

Host genus: *Regimbartia* (Hydrophilidae).

Host species in Thailand: *Regimbartia attenuata* (Fabricius).

Distribution: Java, Sumatra, Thailand (new record), the Philippines, Formosa and Japan.

Specimen examined: Saraburi, Thailand, March 24, 1982, K-S-3328.

This species is characterized by the long posteriorly curved perithecial projection. It is similar to *A. globariae* Thaxter in general appearances. However, the present species is distinguished from *A. globariae* by the slenderer and larger perithecium. The specimens were found on the inferior surface of the abdomen.

2. Autoicomyces herocharalis Thaxter, *Mem. Amer. Acad. Arts Sci.* **14** : 358 (1926). (Fig. 2, A).

Total length to the tip of perithecium exclusive of the apical projection, 250–265 μm long, 65–70 μm thick. Thallus hyaline, partly brownish, consisting of a receptacle and a perithecium. Receptacle brownish, comprising the basal and distal portions, 150–160 μm long, 47–52 μm thick; the basal portion cylindrical, slightly tapering towards the basal end, composed of a basal cell and three flat superimposed cells, forming basally a conical large blackish foot, 85–90 μm long, 47–52 μm thick; the distal portion gradually tapering towards the distal end, simple or branched (? : distal parts broken in the specimens examined), 65–75 μm long, 22–27 μm thick. Perithecium more darkly suffused than the receptacle, ellipsoidal, consisting of eight or more layers of wall-cells, forming two long projections at both the anterior and posterior sides of subterminal portion, 150–170 μm long, 40–53 μm thick; the perithecial projections cylindrical, comprising 7–9 superimposed cells, curved strongly outwards, gradually tapering towards the distal end, branched once or twice at the distal portion, 165–190 μm long, 27–37 μm thick. Antheridium not observed.

Host genus: *Helochares* (pydrophilidae).

Host species in Thailand: *Helochares lentus* Sharp.

Distribution: Africa, Sumatra, Thailand (new record) and China.

Specimens examined: Saraburi, Thailand, March 23, 1982, K-S-3383 and 3389.

This species is characterized by the large blackish foot and two long projections at the subterminal parts of the perithecium. This fungus species is similar to *A. bicornis* Thaxter in having two perithecial projections. However, the present species is distinguished from *A. bicornis* by more developed projections. The fungi collected in Thailand are a little larger than the type, though they are safely included in the present species. The specimens examined were collected on the inferior surface of the abdomen.

3. Autoicomyces siamensis Sugiyama et Phanichapol, sp. nov. (Fig. 1 and Fig. 2, B).

Thallus hyalinus, partim brunneolus, ex receptaculo perithecio singularibus et appendicibus paucis compositus, 115–170 μm longus, extra processum perithecii, 25–45 μm crassus. Receptaculum cylindraceum, terminaliter attenuatum, 95–105 μm longum, 27–30 μm crassum. Perithecium ellipticum, processum breviculum genuflexum bicellularem subapicaliter anteriore formatum, 62–92 μm long extra stipiti, 22–45 μm crassum.

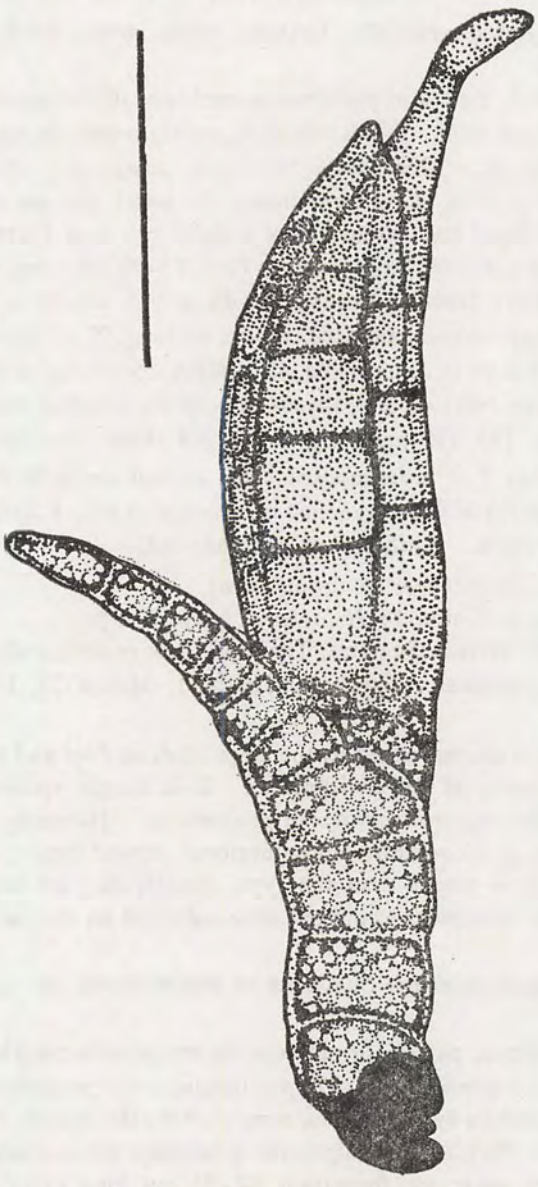


Figure 1. *Autoicomyce siamensis* Sugiyama et Phanichapol, sp. nov. Scale : 50 μm

Typus : K-S- 3333 (in the National Science Museum, Tokyo).

Total length to the tip of perithecium exclusive of the perithecial projection 115–170 um, 25–45 μm thick. Thallus hyaline, partly brownish, consisting of a receptacle, a perithecium and often a few appendages. Receptacle composed of the basal and distal portions, 95–105 μm long, 27–30 μm thick; the basal portion cylindrical, comprising four superimposed one-celled layers, 30–57 μm long, 27–30 μm thick; the basal layer almost wholly included in a blackish suffusion in common with the foot; the distal portion of receptacle composed of a single series of one-celled layers, 22–50 μm long, 7–12 μm thick. Perithecium darker than the receptacle, consisting of a stalk and perithecium proper; the stalk one-celled, formed on the anterior side of the fourth layer of the basal portion of receptacle, 5–15 μm long, 5–15 μm thick; perithecium proper darker than any other portions of the thallus, ellipsoidal, curved anteriorly at apical portion, united basally to the fifth layer of the distal portion of receptacle, forming a projection, 62–92 μm long, 22–45 μm thick; the perithecial projection formed at the anterior side of the subapical portion, comprising a basal and a subbasal cell, 22 35 μm long, 7–10 μm thick; the basal cell cylindrical, curved anteriorly, 15–22 μm long, 7–10 μm thick; the subbasal cell ellipsoidal, placed obliquely on the basal cell, 7–12 μm long, 5–7 μm thick. Antheridium not observed.

Host genus : *Regimbartia* (Hydrophilidae).

Host species in Thailand : *Regimbartia attenuata* (Fabricius).

Distribution : Thailand.

Specimens examined : Saraburi, Thailand, March 24, 1982, K-S-3424; the same locality, March 25, 1982, K-S-3332, 3333 and 3381; the same locality, March 26, 1982, K-S-3312.

This species is characterized by the subsigmoidal thallus and the short curved perithecial projection. This fungus species is similar to *A. anaceros* Spegazzini, *A. humilis* Thaxter and *A. fragilis* Thaxter, though *A. siamensis* is distinguished from the former two species in having a perithecial projection and from the last species by the distinctly curved projection. The specimens examined were collected on the margin of the inferior surface of the abdomen.

4. Chitonomyces bakeri Thaxter, *Mem. Amer. Acad. Arts Sci.* **15** : 516 (1926). SUGIYAMA & SHAZAWA, *Trans. mycol. Soc. Japan* **18** : 271 (1977). (Fig. 3, D and Fig. 4.E)

Thallus hyaline, yellowish brown except the basal and distal ends which are blackish, cylindrical, curved in the shape of C, 247–282 μm long, 42–62 μm thick. Receptacle cylindrical, composed of basal and distal portions, 190–202 μm long, 35–45 μm thick; the basal portion forming a stalk of the thallus, consisting of two one-cell layers, 57–62 μm long, 32–50 μm thick; the first layer obconical, hyaline except the basal foot which is blackish, 27–37 μm long, 27–47 μm thick, joined distally with

subbasal portion of the second layer, forming a bending part of the receptacle; the second layer hyaline, round at the free basal end, 20–27 μm long, 32–50 μm thick; the distal portion of receptacle cylindrical, about half as thick as the basal portion, comprising four superimposed layers, 120–142 μm long, 32-37 μm thick; the first layer composed of two obliquely superposed cells, with a rather flat anterior cell and a longer posterior one placed obliquely on the posterior side of the anterior cell projecting upward, 25–35 μm long, 32–37 μm thick; the second layer one-celled, slightly longer than thick, 45–50 μm long, 15–17 μm thick; the third layer composed of two cells arranged antero-posteriorly, 25–30 μm long, 15–20 μm thick; the anterior cell smaller than the posterior, with the distal portion projecting obliquely upwards and rounded terminally; the posterior cell cylindrical, about three times longer than thick; the fourth layer one-celled, bell-shaped, placed on the posterior cell of the third layer, forming the blackish pointed termination, 27–35 μm long, 10–15 μm thick. Perithecium cylindrical, concolorous wtih the receptacle except for the distal portion which is blackish and opaque, gently curved posteriorly, comprising a stalk and perithecium proper, 207–227 μm long, 42–52 μm thick; the stalk one-celled, formed on the basal cell of the third layer of the basal portion of receptacle; perithecium proper cylindrical, thickest at subbasal portion, uniformly tapering towards the rounded tip, blackened at distal one-third, 202-207 μm long, 40–52 μm thick. Spores fusiform, two-celled, 30–31 μm long, 2 μm thick.

Host genus : *Laccophilus* (Dytiscidae).
Host species in Thailand : *Laccophilus obtusus* Sharp.
Distribution : Thailand (new record), the Philippines, Formosa and China.
Specimens examined : Saraburi, Thailand, March 25, 1982, K-S-3348, 3354 and 3475.

This species is characterized by the blackish, thinly elongate distal portion of the perithecium and by the basal portion of receptacle bent at the junction of the first and second layers almost in a right angle. It is similar to *C. chungii* Thaxter in the shape and color of the perithecium. However, *C. bakeri* is distinguished from *C. chungii* by the special shape of the basal portion of the receptacle. The specimens were collected from the dorsal surface of the exposed abdominal tip. This position coincides with that on which the type had been found (THAXTER 1926).

5. Chitonomyces chinensis Thaxter, *Mem. Amer. Acad. Arts Sci.* **14** : 405 (1924) et **15** : 517 (1926). SUGIYAMA, *Trans. mycol. Soc. Japan* **18** : 157 (1977). (Fig. 2, E, and Fig. 3, C).

Thallus hyaline, suffused with yellowish-brown, partly blackish and opaque, 180–210 um long in height, 37–57 μm thick. Receptacle cylindrical, gently curved posteriorly through the entire length, consisting of the basal and distal portions, 172–

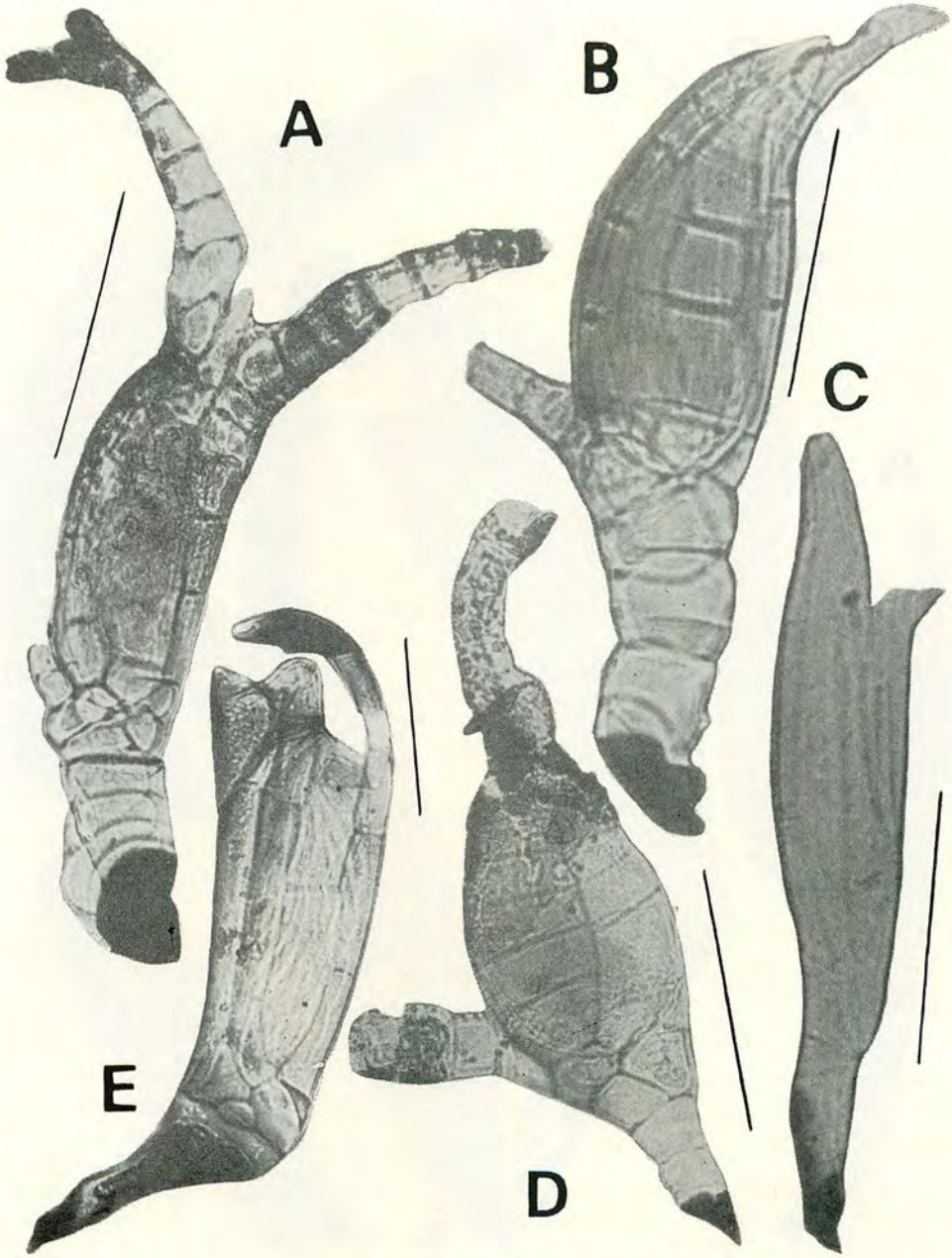


Figure 2. A : *Autoicomyces herocharalis* Thaxter. B : *Autoicomyces siamensis* Sugiyama et Phanichapol sp. nov. C : *Chitonomyces thaxteri* Spegazzini. D : *Autoicomyces falcifer* Thaxter. E : *Chitonomyces chinensis* Thaxter. Scales : A and D; 100 μm. B, C and E; 50 μm.

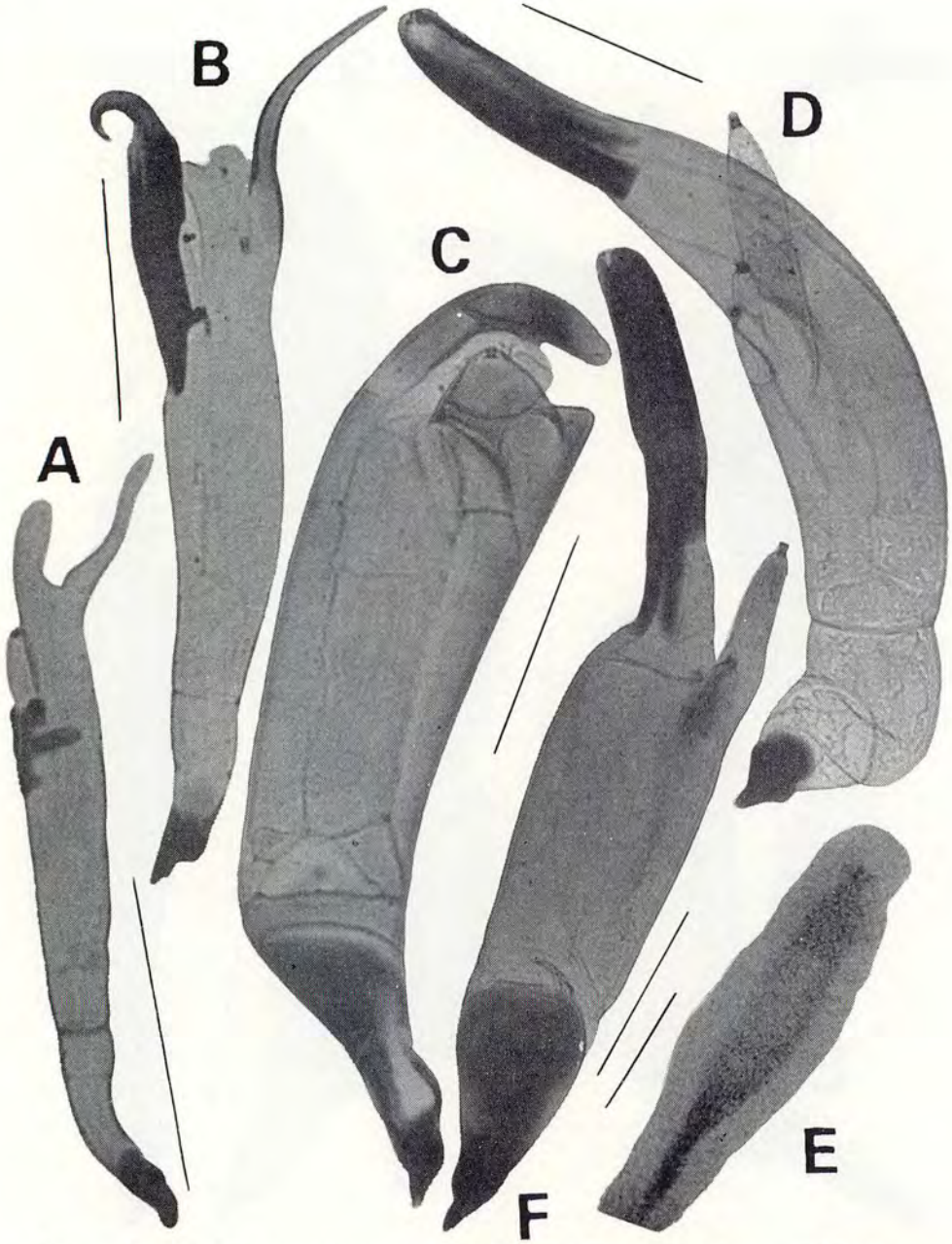


Figure 3. A : *Chitonomyces zonatus* Thaxter. B : *Chitonomyces japanensis* Thaxter.
C : *Chitonomyces chinensis* Thaxter. D : *Chitonomyces bakeri* Thaxter.
E : The receptacle projection of *Zodiomyces subseriatus* Thaxter.
F : *Chitonomyces chungii* Thaxter. Scales : 50 μm.

197 μm long, 30–37 μm thick; the basal portion forming a stalk portion of the thallus, composed of two one-celled layers, 65–72 μm long, 30–37 μm thick; the first layer about twice longer than thick, broadly blackened and opaque along the posterior margin with very a hyaline part at the middle, gradually tapering towards the basal end, strongly bent posteriorly, 57–65 μm long, 27–30 μm thick; the second layer flat, more than three times thicker than long, wholly hyaline and yellowish, partly suffused with brown, 7.5–10 μm long, 30–37 μm thick; the distal portion of receptacle consisting of four layers of cells, 135–137 μm long, 25–37 μm thick; the first layer composed of two cells arranged side by side, partitioned with an oblique septum, 12–20 μm long, 17–30 μm thick; the distal end of the anterior side strongly depressed; the second layer one-celled, cylindrical, more or less tapering towards the basal end, separated from the posterior cell of the first layer by an oblique septum, 80–92 μm long, 12–15 μm thick; the third layer composed of two cells arranged antero-posteriorly, 27–35 μm long, 25–35 μm thick; the anterior cell projecting obliquely upwards to form a conical prominence; the fourth layer one-celled, bell-shaped, placed obliquely on the posterior cell of the third layer, 12–20 μm long, 15–17.5 μm thick. Perithecium yellowish-brown except for the distal projection which is blackish and opaque, comprising a perithecial stalk, perithecium proper and basal and distal projections, 142–160 μm long, 32–37 μm thick; the stalk one-celled, formed besides the anterior side of the first layer of the distal portion of receptacle, united to it, subtriangular when viewed laterally, often forming distally a small brownish conical projection, 10–15 μm long, 7–10 μm thick; the projection 5–7 μm thick; the perithecium proper cylindrical, more or less becoming thinner towards both the basal and distal ends, rounded terminally, united laterally to the second and third layers of the distal portion of the receptacle, forming terminally a blackish horn-shaped projection, 90–112 μm long, 30–37 μm thick : the projection curved posteriorly beyond the distal pore of the perithecium and over the distal end of the receptacle, 45–57 μm long, 12–15 μm thick.

Host genus : *Laccophilus* (Dytiscidae).

Host species in Thailand : *Laccophilus chinensis* Boheman, *L. ellipticus* Régimbart and *L. siamensis* Sharp.

Distribution : Thailand (new record), Borneo, Formosa, China and Japan.

This species is characterized by the blackish horn-shaped distal projection of the perithecium and by the broadly blackened basal portion of the receptacle.
It is similar to *C. paradoxus* (Peyritsch) in having a perithecial projection. However, these two species are distinguished in that the perithecial projection of *C. chinensis* is blackened and strongly curved, while that of *C. paradoxus* is hyaline and not strongly curved. THAXTER (1926) mentioned and figured the presence of a conical prominence on the side of the perithecial stalk in the second part of his monograph. This projection is found in every fungus collected in Thailand. The specimens were found on the middle portion of the abdominal margin of the hosts.

6. ***Chitonomyces chungii*** Thaxter, *Mem. Amer. Acad. Arts & Sci.* **15**: 518 (1926). (Fig. 3, F).

Thallus hyaline with a tint of yellowish-brown, partly blackish and opaque, almost fusiform, 257–192 μm long, 45–50 μm thick. Receptacle cylindrical, composed of basal and distal portions, 192–220 μm long, 40–47 μm thick; the basal portion stout, forming a stalk of the thallus, consisting of two one-cell layers, 64–82 μm long, 40–47 μm thick; the first layer almost wholly blackened and opaque, forming basally an obconical foot, 57–75 μm long, 37–45 μm thick; the second layer flat, about six times thicker than long, 6–7 μm long, 40–47 μm thick; the distal portion of receptacle consisting of four superimposed layers of cells, about half as thick as the basal portion, 122–137 μm long, 35–47 μm thick; the first layer consisting of two cells partitioned with an oblique septum, placed almost above and below; the posterior cell projecting upwards; the second layer one-celled, long and slender, 52–62 μm long, 13–17 μm thick; the third layer composed of two cells arranged side by side; the tip of the anterior cell projecting and forming a small prominence; the fourth layer one-celled, bell-shaped, formed on the distal end of the posterior cell of the third layer, 27–32 μm long, 13–14 μm thick. Perithecium hyaline at basal half, blackened at distal half, composed of a stalk and perithecium proper, 187–210 μm long, 30–37 μm thick; the stalk one-celled, placed obliquely on the second layer of the basal portion of receptacle, 10–12 μm long; 22–30 μm thick, the perithecium proper comprising the basal and distal portions, 175–197 μm long, 27–37 μm thick: the basal portion hyaline, thickest at the base, gradually tapering upwards, united posteriorly to the basal three layers of the distal portion of receptacle, 75–85 μm long, 27–37 μm thick; the distal portion of perithecium proper cylindrical, blackish, tapering towards the rounded distal end, often more or less curved, 102–112 μm long, 16–18 μm thick. Spores fusiform, two-celled, 77–80 μm lomg, 4–5 μm thick.

Host genus: *Laccophilus* (Dytiscidae).

Host species in Thailand: *Laccophilus parvulus obtusus* Sharp.

Distribution: Thailand (new record) and China.

Specimens examined: Saraburi, Thailand, March 25, 1982, K-S-3351 and 3357.

This fungus species is characterized by the blackish elongate distal portion of the perithecium and is similar to *C. chungii* in this respect. However, these two species are distinguished in that *C. chungii* is straight and broadly blackened at the basal portion of receptacle, while *C. bakeri* is only partly blackened in this portion and bends strongly at the junction of the first and second layers of the receptacle. The specimens were found on the inferior surface of the posterior end of the abdomen. This position coincides with that on which the type had been collected (THAXTER 1926).

7. *Chitonomyces japanensis* Thaxter, *Mem. Amer. Acad. Arts Sci.* **14** : 404 (1924) et **15** : 524 (1926). SUGIYAMA, *Ginkgoana* **2** : 23 (1973). (Fig. 3, B).

Thallus hyaline with tint of yellowish brown except for some basal and distal portions which are blackish and opaque, 157–160 μm long, 27 μm thick. Receptacle cylindrical, consisting of the basal and distal portions, 135–137 μm long, 12–13 μm thick; the basal portion forming a stalk of the thallus, composed of two one-cell layers, 35 μm long, 12–13 μm thick; the first layer forming basally a blackish obconical foot, 20–22 μm long, 10 μm thick; the second layer approximately as long and thick as the first; the distal portion of receptacle slightly thinner than the basal one, consisting of four layers which consist of one or two cells, 105 μm long, 12–13 μm thick; the first layer composed of two cells partitioned by an oblique septum and placed almost above and below, 15 μm long, 10 μm thick: the second layer unicellular, slender; the third layer comprising two cells separated antero-posteriorly by an oblique septum; the anterior cell hyaline, projecting distally forming a small conical projection; the posterior cell wholly blackened; the fourth layer wholly blackened in common with the posterior cell of the third layer, horn-shaped, strongly curled posteriorly and tapering towards the pointed termination at distal portion, 40–42 μm long 10 μm thick. Perithecium hyaline, consisting of a stalk, perithecium proper and a subapical projection, 125 μm long, 15 μm thick, the stalk one-celled, formed above the second layer of the basal portion of receptacle, separated from the first layer of the distal portion of receptacle by an oblique septum, 17 μm long, 7–8 μm thick; the perithecium proper cylindrical, more or less tapering towards the coarse tip, forming a long projection at subapical portion of the anterior side, 75–77 μm long, 15 μm thick; the projection hyaline tapering towards the pointed termination, bent anteriorly at middle portion, 42–45 μm long, 5 μm thick.

Host genus: *Laccophilus* (Dytiscidae).
Host species in Thailand : *Laccophilus siamensis* Sharp.
Distribution : Thailand (new record), China and Japan.
Specimen examined: Saraburi, Thailand, March 23, 1982, K-S-3439.

This fungus species is characterized by the blackish, outwardly curved distal end of the receptacle and by the slender subapical projection of the perithecium. This is similar to *C. helicofer* Thaxter, *C. melanurus* Peyritsch and *C. javanicus* Thaxter in general appearance. The present species is distinguished from the first two of these species in having a long perithecial projection, and from the third species by the curved termination of the receptacle. The specimens examined were found on the posterior margin of the left elytron. This position coincides with that on which the type had been found (THAXTER 1924 and 1926).

8. *Chitonomyces javanicus* Thaxter, *Proc. Amer. Acad. Arts Sci.* **41**: 307 (1905) et *Mem. Amer. Acad. Arts Sci.* **13**: 266 (1908) et **14**: 404 (1924) et **15**: 525 (1926). (Fig. 4, B).

Thallus hyaline with tint of dirty yellowish, partly blackish, slender, 162–223 μm long, 20–38 μm thick. Receptacle cylindrical, comprising the basal and distal portions, 162–223 μm long, 14–17 μm thick; the basal portion forming a stalk of the thallus, often weakly curved posteriorly, consisting of two one-cell layers, 47–65 μm long, 11–15 μm thick; the first layer longer than thick, forming a blackish obconical foot at the basal end, suffused with brown above the foot, 24–33 μm long, 10–14 μm thick; the second layer hyaline, about twice longer than thick, 18–38 μm long, 11–15 μm thick; the distal portion of receptacle long and slender, composed of four layers of cells, 112–157 μm long, 14–16 μm thick; the first layer hyaline, suffused with dirty yellowish, comprising two cells separated by an oblique septum and often placed almost above and below, 19–24 μm long, 14–17 μm thick; the anterior cell projecting upwards; the second layer concolorous with the first layer, one-celled, very long and slender, 30–38 μm long, 14–16 μm thick; the third layer composed of two cells arranged antero-posteriorly, 20–27 μm long, 10–15 μm thick; the anterior cell hyaline, projecting distally to form a small conical prominence; the posterior cell blackish and opaque; the fourth layer blackish, included in a common suffusion with that of the posterior cell of the third layer, straight, nipple-shaped at the termination, 50–60 μm (?) long, 12–14 μm thick. Perithecium concolorous with the lower portion of the receptacle, cylindrical, consisting of a one-celled stalk, perithecium proper and apical two projections, 107–135 μm long, 14–19 μm thick; the stalk very small, formed obliquely above the first layer of the distal portion of receptacle, 15–17 μm long, 5–6 μm thick; the perithecium proper faintly suffused with brown, united to the second and third layers of the distal portion of receptacle in the posterior side, tapering towards the thinly rounded termination at distal portion, 95–117 μm long, 15–22 μm thick; the projections formed on the anterior and posterior sides of subapical portion of perithecium proper beneath the lip-cells; the anterior projection cylindrical, blackish, tapering towards the thinly rounded termination, 15–22 μm long, 5–7 μm thick; the posterior projection paler and stouter than the anterior, inflated distally, more or less curved posteriorly, 18–25 μm long 14–16 μm thick. Spore fusiform, two-celled, 37–38 μm long, 2–3 μm thick.

Host genus: *Laccophilus* (Dytiscidae).

Host species in Thailand: *Laccophilus ellipticus* Régimbart, *L. parvulus obtusus* Sharp and *L. sharpi* Régimbart.

Distribution: Sumatra, Java, Peninsular Malaysia. Thailand (new record), Borneo and China.

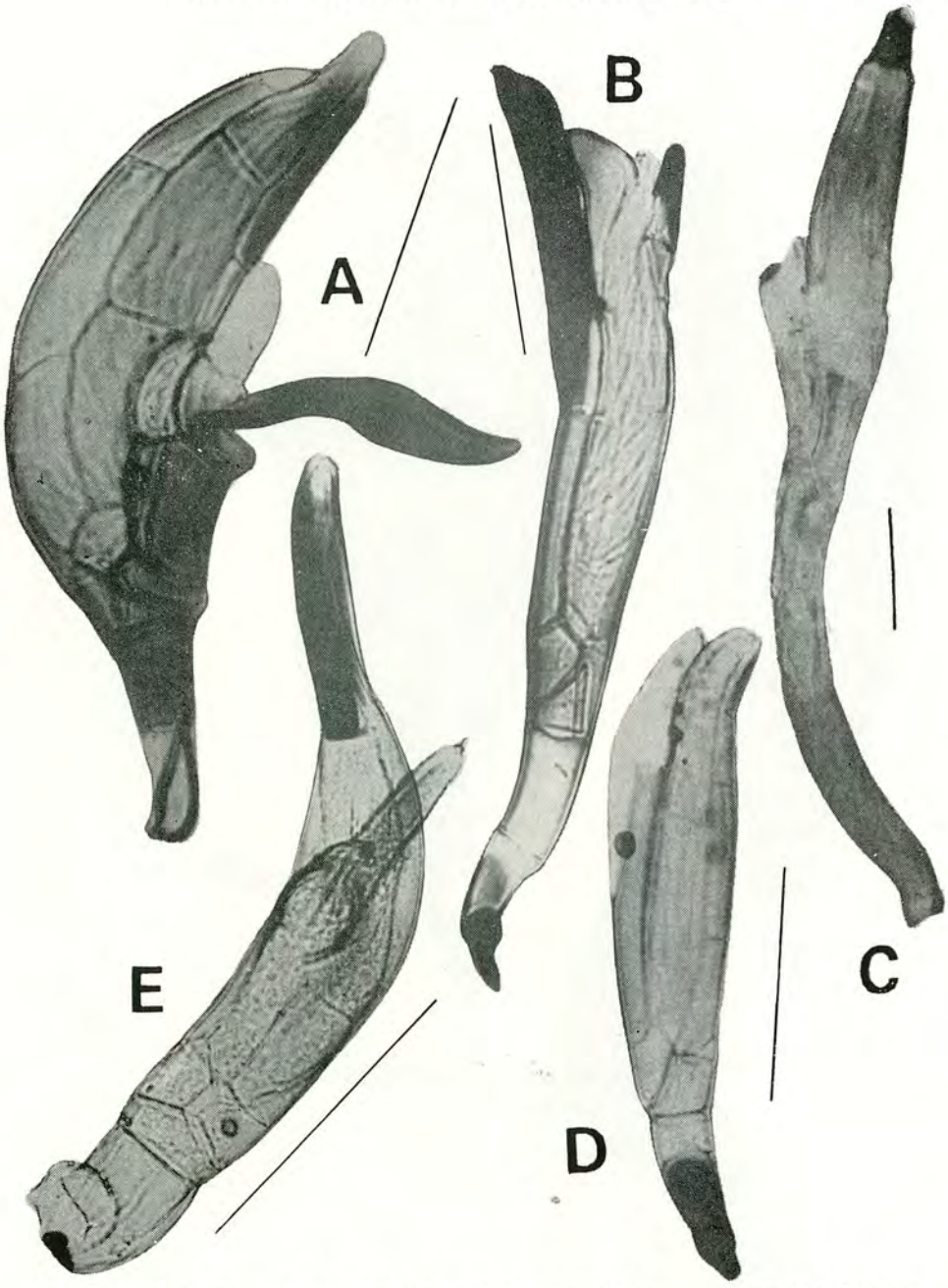


Figure 4. A : *Chitonomyces manbriolatus* Thaxter. B : *Chitonomyces javanicus* Thaxter. C : *Laboulbenia proliferans* Thaxter (the receptacle branches broken off) D : *Chitonomyces ordinatus* Thaxter. E. *Chitonomyces bakeri* Thaxter.Scales : A, B and D; 50 μm. C and E; 100 μm.



Figure 5. A and B : *Chitonomyces paradoxus* (Peyritsch) Thaxter. C : *Chitonomyces rugosus* Thaxter. D : *Laboulbenia idiostoma* Thaxter. Scales : 50 μm.

Specimens examined: Saraburi, Thailand, March 25, 1982 K–S–3345, 3346, 3348, 3351, 3356, 3357, 3362, 3365, 3371, 3372, 3410, 3416, 3419, 3430, 3437, 3438, 3441, 3450, 3451, 3452, 3454, 3455, 3457, 3463, 3464, 3469, 3471, 3472, 3473, 3475, 3477, 3479, 3482, 3483, 3484, 3485, 3486, 3488 and 3489; the same locality, March 26, 1982, K–S–3366, 3422, 3426, 3427, 3429, 3431 and 3432.

This species is characterized by the blackish nipple-shaped termination of the receptacle and by the blackish anterior projection of the perithecium. This species is allied to *C. japanensis* Thaxter, *C. melanurus* Peyritsch and *C. intermedius* Thaxter, though *C. javanicus* is distinguished from the former two species by the straight distal end of the receptacle and by the blackish anterior projection of the perithecium, and from the latter species by the nipple-shaped termination of the receptacle. Most specimens were collected on the outer margin of the elytra and a few were in the middle portion of the inferior surface of the left side of abdomen and on the posterior legs.

9. Chitonomyces manubriolatus Thaxter, *Proc. Amer. Acad. Arts Sci.* **52** : 9 (1916) et *Mem. Amer. Acad. Arts. Sci.* **14** : 394 (1924). (Fig. 4, A).

Thallus hyaline, yellowish-brown, partly blackish, stout, subsigmoidal, comprising a receptacle and a perithecium, 137–158 μm long, 42–53 μm thick. Receptacle cylindrical, relatively short and slender, consisting of the basal and distal portions, 100–117 μm long, 19–22 μm thick; the basal portion stalk-like, composed of two one-cell layers, tapering towards the base, 40–52 μm long, 17–20 μm thick; the distal portion of receptacle consisting of five superimposed layers of cells, 62–70 μm long, 19–22 um thick; all layers one-celled except the fourth one; the first layer flat, 6–9 μm long, 18–20 μm thick; the anterior side about twice longer than the posterior; the second layer one-celled, flat, 6–9.5 μm long, 20–22 μm thick; the third layer more than twice longer than the lower layers, 22–25 μm long, 19–22 μm thick; the fourth layer composed of two cells arranged antero-posteriorly, 17–27 μm long, 19–22 μm thick; the anterior cell hyaline, distinct from darker posterior cell, projecting apically to form a small bell-shaped prominence; the posterior cell strongly concave posteriorly, forming a brownish long projection at the concave portion; the projection cylindrical, thickest at about middle portion, tapering towards the thinly rounded termination; the fifth layer hyaline, bell-shaped, 17–20 μm long, 9–10 μm thick. Perithecium concolorous with the receptacle, fusiform, more convex at the anterior side, consisting of a stalk and perithecium proper, 105–117 μm long, 32–37 μm thick; the stalk one-celled, formed above the second layer of the basal portion of receptacle, united laterally to the first and second layers of the distal portion of receptacle, 12–17 μm long, 11–12 μm thick; the perithecium proper thickest at about middle portion, with the projecting termination, united to the second and third layers of the distal portion of receptacle in the posterior side, 92–100 μm long, 32–37 μm thick. Spores fusiform, two-celled, 40–45 μm long, 3.5 μm thick.

Host genus : *Laccophilus* (Dytiscidae).

Host species in Thailand : *Laccophilus parvulus obtusus* Sharp.

Distribution : West Indies and Thailand (new record).

Specimens examined : Saraburi, Thailand, March 25, 1982, K-S-3472, 3473, 3488 and 3489.

This fungus species is characterized by a stout subsigmoidal thallus and a long lateral projection of the receptacle. Similar projections are found in allied two species, *C. itallicus* Spegazzini and *C. spinosus* Thaxter. However, the apex of the projection is branched in *C. italicus* and curved upwards at a right angle in *C. spinosus*. The specimens were collected on the left hind-leg of the hosts. This position coincides with that on which the type had been found (THAXTER, 1924),

10. ***Chitonomyces ordinatus*** Thaxter, *Mem. Amer. Acad. Arts Sci.* **15** : 527 (1926). (Fig. 4, D and Fig. 6. D).

Thallus hyaline with tint of yellowish-brown, partly blackish, 125-162 μm long, 29–37 μm thick. Receptacle cylindrical, gently curved anteriorly, consisting of basal and distal portions, 123–155 μm long, 20–23 μm thick; the basal portion cylindrical, tapering towards the basal end, forming a stalk of the thallus, including two one-celled layers, 35–47 μm long, 54–18 μm thick; the first layer almost wholly blackish, partly hyaline, about twice as long as thick, tapering towards the obconical foot, 25–35 μm long, 12–13 μm thick; the second layer hyaline, 10–12 μm long, 14–17 μm thick; the distal portion of receptacle concolorous with the layer beneath it, comprising four layers of cells, 90–112 μm long, 20–23 μm thick; the first layer composed of two cells arranged antero-posteriorly and separated from each other by an oblique septum, 12.5–18 μm long, 29–23 μm thick; the second layer one-celled, long and slender, 50–57 μm long, 6.5–9 μm thick; the third layer consisting of two cells arranged antero-posteriorly, 32–45 μm long, 12–15 μm thick; the anterior cell smaller than the posterior, projecting distally forming a small conical prominence; the fourth layer one-celled, formed on the posterior cell of the third layer, 15–17 μm long, 7.5–9 μm thick. Perithecium concolorous with the distal portion of receptacle, suffused with dirty brown, composed of a stalk and perithecium proper, 82–95 μm long, 20–25 μm thick; the stalk one-celled, small, triangular in lateral view, formed above the anterior cell of the first the layer of distal portion of receptacle, 4–5 μm long, 4–7.5 μm thick; perithecium proper partly suffused with dirty brown, cylindrical, gently curved anteriorly, more or less tapering towards a broadly roundly termination, united to the second and third layers of the distal portion of receptacle on the posterior side, 77–90 μm long, 20–22 μm thick.

Host genus : *Laccophilus* (Dytiscidae).

Host species in Thailand: *Laccophilus parvulus obtusus* Sharp and *L. sharpi* Régimbart.

Distribution : Sumatra, Thailand (new record) and China.

Specimens examined: Saraburi, Thailand, March 25, 1982, K-S-3314, 3351, 3361, 3356, 3414, 3418, 3419, 3423, 3430, 3440, 3452, 3466, 3468, 3470, 3476, 3485 and 3489; the same locality, March 26, 1982, K-S-3349.

The present species is characterized by a slender thallus and a blackish suffusion of the first layer of the basal portion of the receptacle, and resembles *C. arcuatus* Thaxter in these respects. However, *C. ordinatus* is distinguished from *C. arcuatus* by the slenderer and straighter perithecium. The specimens examined were found on the tip of the right elytron and on the tip of the inferior surface of the abdomen. These positions coincide with those on which the types were found (THAXTER, 1926).

11. Chitonomyces paradoxus (Peyritsch) Thaxter, *Proc. Amer. Acad. Arts Sci.* **27** : 32 (1892) et *Mem. Amer. Acad. Arts Sci.* **12** : 287 (1896) et **14** : 406 (1924). SUGIYAMA, *Ginkgoana* **2** : 24 (1973). (Fig. 5, A and B).

Heimatomyces paradoxus Peyritsch, *Sitzungsb. Kaiserl. Akad. Wissensch. Math.-Naturwissensch, Klasse* **68** : 251 (1873).

Thallus hyaline with tint of yellowish-brown, hatchet-shaped, stout; 135–195 μm long, 55–67 μm thick. Receptacle composed of basal and distal portions, 110–155 μm long, 32–37 μm thick : the basal portion included in blackish suffusion, composed of two one-cell layers, tapering towards the pointed tip of the basal obconical foot, 47–62 μm long, 32–37 μm thick; the first layer blackish; opaque except the anterior side of the upper portion, 45–57 μm long, 27–30 μm thick; the second layer flat, 7.5–10 μm long, 32–37 μm thick; the distal portion of receptacle cylindrical, almost wholly hyaline, comprising four layers of cells, 62–97 μm long, 20–27 μm thick; the first layer consisting of two cells arranged antero-posteriorly and separated from each other by an oblique septum, 6.5–10 μm long, 20–27 μm thick; the second layer long and slender, formed above the posterior cell of the first one, 32–55 μm long, 11–12 μm thick; the third layer comprising two cells arranged antero-posteriorly and separated from each other by an oblique septum, 17–27 μm long, 11–12 μm thick; the anterior cell thinner; the fourth layer one-celled, formed above the posterior cell of the third layer, bell-shaped, 15–22 μm long, 9–10 μm thick. Perithecium composed of a stalk, perithecium proper and an apical projection, 87–140 μm long, 40–47 μm thick; the stalk one-celled, formed above the second layer of the basal portion of receptacle, united to the anterior cell of the first layer of the distal portion of receptacle on lateral side, 6.5–10 μm long, 20–22 μm thick; the perithecium proper ellipsoidal, united to the second and third layers of the distal portion of receptacle on the posterior side, forming a large conical projection beside the pore of the perithecium, 72–85 μm long, 40–48 μm thick: the projection more or less curved anteriorly, pointed at the termination, 20–48 μm long, 20–25 μm thick,

Host genus : *Laccophilus* (Dytiscidae).

Host species in Thailand : *Laccophilus chinensis* Boheman, *L. ellipticus* Régimbart, *L. sharpi* Régimbart and *L. uniformis* Motschulsky.

Distribution : Europe, Sumatra, Thailand (new record), Borneo, Formosa and U.S.A.

Specimens examined : Saraburi, Thailand, March 23, 1982, K-S-3330, 3375, 3380, 3382, 3385, 3386, 3404, 3433, 3435, 3444, 3447, 3449, 3453, 3456 and 3458; the same locality, March 26, 1982, K-S-3350, 3355, 3363 and 3394.

The present species is characterized by its broadly blackened basal part of the receptacle and by the large conical projection at the perithecial apex. It is somewhat similar to *C. chinensis* in general appearance and the method of cell arrangement of the receptacle. However, these two species are distinguished in that the perithecial projection of *C. paradoxus* is hyaline and almost straight, while that of *C. chinensis* is blackish and distinctly curved posteriorly. The specimens examined were collected on middle portion of the elytral outer margin and on middle portion of the margin of the abdominal inferior surface.

12. *Chitonomyces rugosus* Thaxter, *Mem. Amer. Acad. Arts Sci.* **14** : 39 (1924). (Fig. 5, C).

Thallus hyaline with tint of yellowish-brown, cylindrical, gradually tapering towards the base, 150–165 μm long, 40–42 μm thick. Receptacle cylindrical, slender, consisting of basal and distal portions, 137–157 μm long, 15–17 μm thick; the basal portion stalk-like, composed of two one-cell layers, 37–38 μm long, 12–13 μm thick; the first layer long, tapering towards the basal obconical foot, 32–33 μm long, 10–11 μm thick; the second layer small and flat, 5 μm long, 12–13 μm thick; the distal portion of receptacle slender, comprising four layers of cells, 100–121 μm long, 15–17 μm thick; the first layer formed on the posterior side of the distal end of the second layer of the basal portion of receptacle, 30–35 μm long, 15–17 μm thick; the second and third layers long and slender, separated by an oblique septum from each other to be placed almost side by side; the second layer 60–75 μm long, 10 μm thick; the third layer 37–50 μm long, 7–8 μm thick; the fourth layer placed above the third layer, rounded terminally, bell-shaped, 12–13 μm long, 7–8 μm thick. Perithecium cylindrical, relatively large, pale yellowish, blackened along the anterior side of the distal part, consisting of a stalk and perithecium proper, 125–130 μm long, 25–27 μm thick; the stalk composed of two superimposed cells, formed on the anterior side of the second layer of the basal portion of receptacle, united to the first layer of the distal portion of receptacle on the posterior side; the lower cell 28–30 μm long, 15–16 μm thick; the upper cell 12–15 μm long, 7–8 μm thick; perithecium proper almost isodiametric, broadly rounded at the end, more or less curved anteriorly, with fine transverse rugae in the surface of middle portion, united to the second layer of the distal portion of the receptacle in the basal two-thirds of the posterior side, 95–97 μm long, 25–27 μm thick.

Host genus : *Coperatus* (Dytiscidae).

Host species in Thailand : *Coperatus tenebrosus* Régimbart.

Distribution : Thailand (new record) and the Fiji Islands.

Specimens examined : Nonthaburi, Thailand, March 19, 1982, K-S-3401 and 3402.

The main features of the present species are the simple thallus and the rugose surface of the perithecium. These characters are also found in *C. hydropori* Thaxter. However, *C. rugosus* is more finely rugose than *C. hydropori* and the rugae are distributed wider than those of the latter species.

13. *Chitonomyces thaxteri* Spegazzini, *An. Mus. nac. Hist. net. Buenos Aires* **29** : 480 (1917). (Fig. 2, C).

Chitonomyces elongatus Thaxter, nec Spegazzini, *Proc. Amer. Acad Arts Sci.* **52** : 13 (1916).

Thallus hyaline, partly brownish or blackish, very slender, cylindrical, 145 μm long, 27 μm thick. Receptacle consisting of basal and distal portions, 137 μm long, 17 μm thick; the basal portion stalk-like, composed of two one-cell layers, 42 μm long, 15 μm thick; the first layer almost wholly blackish, forming an obconical foot at the base, partitioned from the second layer by a distinctly oblique septum with the anterior side of the distal end placed upper, 32 μm long at the anterior side, 10 μm thick at middle portion; the second layer distinctly paler than the first, tapering towards the base, 25 μm long, 15 μm thick; the distal portion of receptacle cylindrical, long and slender, almost isodiametric, consisting of four superimposed layers of cells, 107 μm long, 8.5 μm thick; the first layer one-celled, formed above the posterior side of the basal portion of receptacle, 17 μm long, 8.5 μm thick; the second layer unicellular, long and slender 50 μm long, 10 μm thick; the third layer comprising two cells arranged antero-posteriorly, 42 μm long, 12 μm thick; the anterior cell smaller than the posterior, projecting distally to form a small bell-shaped prominence; the posterior cell very long, about three times as long as the anterior; the fourth layer one-celled, rounded terminally, forming a blackish small projection, 20 μm long, 10 μm thick. Perithecium cylindrical, long and slender, hyaline, consisting of a stalk and perithecium proper, 100 μm long, 17 μm thick; the stalk composed of two superimposed cells, formed above the posterior side of the distal end of the basal portion of receptacle, united to the first layer of the distal portion of receptacle on the posterior side; the lower cell 17 μm long, 7.5 μm thick : the upper cell 7.5 μm long, 7.5 μm thick; the perithecium proper more or less tapering distally to a coarsely rounded end, united to the second and third layers of the distal portion of receptacle on the posterior side, 92 μm long, 17 μm thick.

Host genus : *Laccophilus* (Dytiscidae).

Host species in Thailand : *Laccophilus parvulus obtusus* Sharp.

Distribution : Thailand (new record), Formosa and West Indies.

Specimen examined : Saraburi, Thailand, March 25, 1982, K-S-3430.

This species is characterized by its slender thallus and by the oblique septum between the first and second layers of the basal portion of the receptacle. It is similar to *C. ordinatus* in general appearances. However, *C. thaxteri* is distinguished from *C. ordinatus* in having a slenderer thallus and in the parallel arrangement of the perithecial stalk and the first layer of the distal portion of the receptacle. The specimen was found on the posterior tip of the left elytron.

14. Chitonomyces zonatus Thaxter, *Mem. Amer. Acad. Arts Sci.* **15** : 535 (1926). (Fig. 3, A)

Thallus hyaline with tint of yellowish-brown, partly blackened, relatively small, slender, 112–135 μm long, 14–15 μm thick. Receptacle cylindrical, consisting of basal and distal portions, 92–102 μm long, 9–10 μm thick; the basal portion stalk-like, composed of two superimposed one-cell layers, 32–35 μm long, 9–10 μm thick; the first layer slender, tapering towards the basal obconical foot, 27–30 μm long, 7–8 μm thick; the second layer 5–7.5 μm long, 9–11 μm thick; the distal portion of the receptacle formed above the posterior side of the distal end of its basal portion, with blackish tubercular transverse bands at about the middle portion, consisting of four layers of cells, 60–70 μm long, 9–10 μm thick; layers one-celled except the third one; the first layer 10–11 μm long, 5–5.5 μm thick; the second layer 25–30 μm long, 3.5–4 μm thick; the third layer comprising two cells arranged antero-posteriorly and separated by an oblique septum, blackened in distal one-third, 12–16 μm long, 6–7 μm thick; the fourth layer rounded terminally, with a small blackish apical prominence, 10–12 μm long, 7–8 μm thick. Perithecium relatively large, cylindrical, composed of a stalk and perithecium proper, 88–99 μm long, 9–10 μm thick; the stalk consisting of two superimposed cells, formed above the anterior side of the distal end of the second layer of the basal portion of receptacle, united posteriorly the first layer of the distal portion of the receptacle, 10–11 μm long, 5,5 μm thick; perithecium proper isodiametric at basal two-thirds, tapering towards the coarse tip at the upper portion and often curved posteriorly in this portion, united to the second and third layer of the distal portion of receptacle, forming a horn-shaped projection at the subapical portion of the anterior side, often wtih transverse blackish bands which are continuous from those of the receptacle, 62–75 μm long, 9–11 μm thick; the perithecial projection concolorous with the perithecium, irregularly curved, tapering towards the thinly rounded tip, 23–35 μm long, 4–5 μm thick.

Host genus: *Laccophilus* (Dytiscidae).

Host species in Thailand: *Laccophilus parvulus obtusus* Sharp.

Distribution: Thailand (new record) and China.

Specimens examined: Nonthaburi, Thailand, March 19, 1982, K-S-3417. Saraburi, Thailand, March 23, 1982. K-S-3377; the same locality, March 25, 1982, K-S-3448, 3459 and 3465.

This species is characterized by the transverse blackish stripes of the receptacle surface and the hyaline perithecial projection. This fungus is similar to *C. appendiculatus* (Thaxter), *C. dentifer* Thaxter and *C. striatus* Thaxter in having a lateral perithecial projection. However, *C. zonatus* is distinguished from the former two species in having blackish stripes on the receptacle and from the latest species in having a longer perithecial projection. The specimens were collected on the anterior and middle portions of the elytra.

15. Dimeromyces cherrhonesites Balazuc. *Bull. Mus. natn. Hist. nat., Paris, Bot.* **22** : 197 (1975). SUGIYAMA & MOCHIZUKA, *Trans. mycol. Soc. Japan* **20** : 340 (1979). (Fig. 8, C and D)

Dioecious. Male plant: Thallus hyaline, more or less yellowish-brown, consisting of a receptacle and about seven compound antheridia. Receptacle cylindrical or probably somewhat leaf-like, thickest at subbasal portion, consisting of the basal and distal portions, 152 μm long, 20 μm thick; the basal portion composed of about 12 superimposed one-cell layers which are thicker than long except the first layer and separated from each other by oblique septa, 87 μm long, 20 μm thick; the first layer 62 μm long, 10 μm thick. Antheridium bottle-shaped, formed singularly on one lateral side of every layer except a few basal ones, 20–28 μm long, 7.5–9.5 μm thick; the distal portion of receptacle thin, filamentous, comprising 6–7 superimposed cells which are longer than thick.

Female plant: Thallus hyaline, similar to the male thallus but larger and probably more flat, consisting of a receptacle, 2–5 perithecia and 4–8 appendages. Receptacle comprising the basal and distal portions, 215–240 μm long, 20–28 μm thick; the basal portion comprising about 20 flat unicellular layers placed almost horizontally; each layer forming unilaterally a perithecium or an appendage except the basal 2–3 layers; the distal portion of receptacle cylindrical, filamentous, often broken off. Perithecium concolorous with the receptacle, fusiform, thinly rounded at the tip, 80–175 μm long, 16–40 μm thick. Appendage cylindrical, filamentous, usually thickest at the base, consisting of about ten superimposed cells, often branching into two branchlets on the basal cell, 173–240 μm long, 12–13 μm thick.

Host genus: *Ceropria* (Tenebrionidae).

Host species in Thailand: *Ceropria* sp.

Distribution : Indochina, Thailand (new record) and Formosa.

Specimens examined : Phrae, Thailand, March 28, 1961, K-S-3491 and 3492.

The most important characters of this species are the relatively broad thallus with many parallel layers and the relatively large numbers of antheridia and perithecia. This fungus is very similar to *D. strongylii* Thaxter, though this is distinguished from the latter in having branched appendages. The specimens were collected on the dorsal surface of the body.

16. Dimeromyces oscinosomalis Thaxter, *Mem. Amer. Acad. Arts Sci.* **14** : 370 (1924). (Fig. 6, E)

Dioecious. Female plant : Thallus hyaline, subsigmoidal, consisting of a receptacle, a perithecium and a few appendages. Receptacle cylindrical, composed of basal, middle and distal portions, 95–110 μm long, 15–25 μm thick; the basal portion unicellular, vesicular, often constricted at the junction of the middle portion, forming basally a small prominence (foot ?), 53 μm long, 25 μm thick; the middle portion comprising five one-celled layers, with constrictions at the junctions of the layers, forming unilaterally a perithecium and appendages, 32–48 μm long, 13–20 μm thick; distal portion separated from the middle portion by a dark septum, cylindrical, filamentous, consisting of several superimposed cells, 13–18 μm long, 2–3 μm thick. Appendages usually three in number, cylindrical, filamentous, more or less suffused with brown, comprising 6–7 superimposed cells, with blackish lower septa, 98–115 μm long, 5–8 μm thick; the terminal cells of some appendages inflated and often broken to make curled tips. Perithecium darker than the receptacle, fusiform, gently constricted at subterminal portion, forming a few small prominences at the apex, formed on the lateral side of the third layer of the middle portion of receptacle, often curved anteriorly, 88–100 μm long, 28–33 μm thick.

Male plant not observed.

Host genus : *Oscinosoma* (Agromyzidae).

Host species in Thailand : a small fly (specimen accidentally lost).

Distribution : Borneo and Thailand (new record).

Specimens examined : Saraburi, Thailand, March 23, 1982, K-S-3509.

The main features of the present species are the vesicular base of the receptacle and the distal portions of appendages which are often broken into spoon-like halves. The specimens were found on the inferior surface of abdomen and on the posterior legs.

17. *Enathromyces indicus* Thaxter, *Mem. Amer. Acad. Arts Sci.* **12** : 276 (1896). (Fig. 8, E).

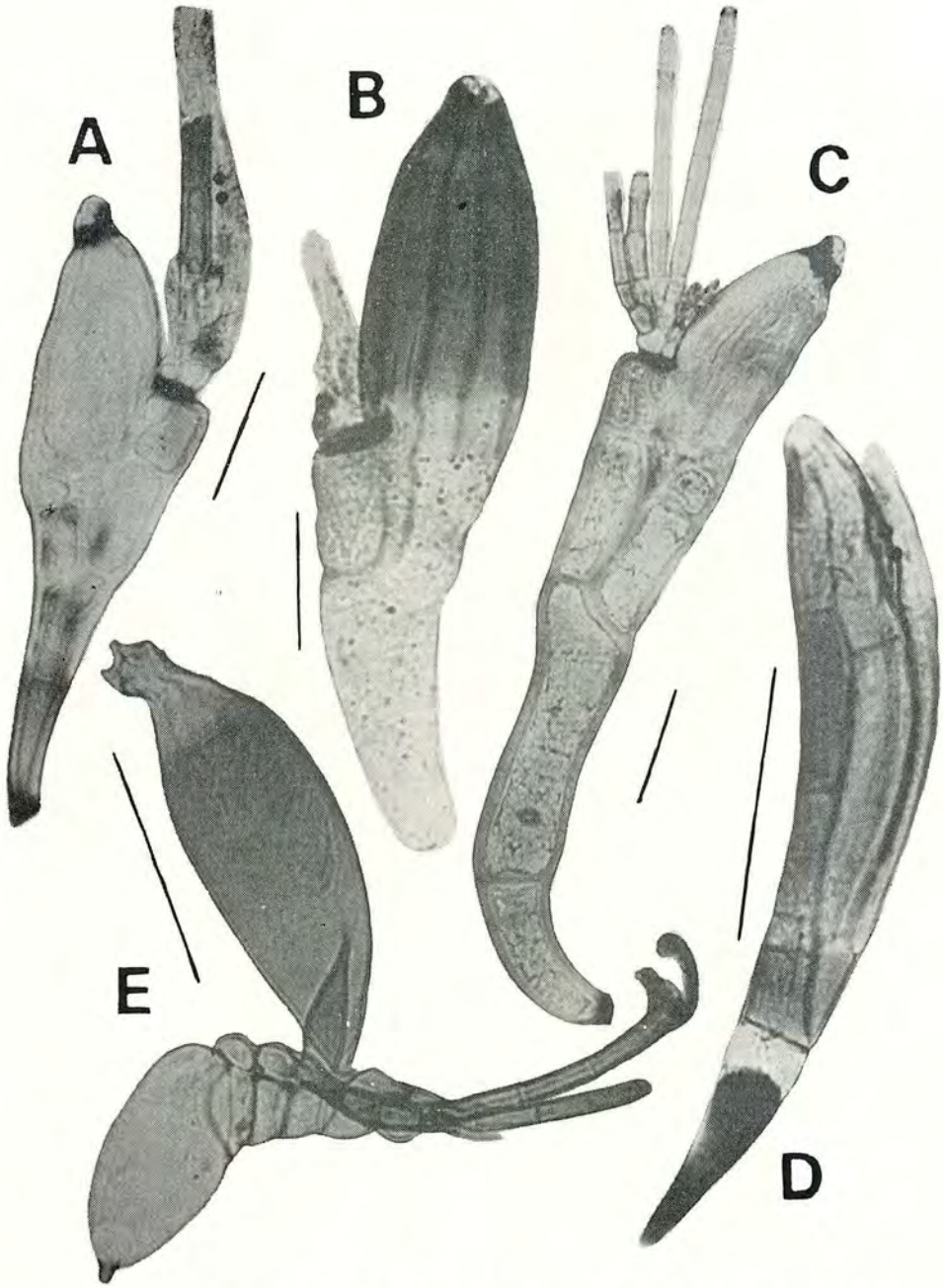


Figure 6. A and C : *Laboulbenia anoplogenii* Thaxter. B : *Laboulbenia celestialis* Thaxter. D : *Chitonomyces ordinatus* Thaxter. E : *Dimeromyces oscinosomalis* Thaxter. Scales : 50 μm.

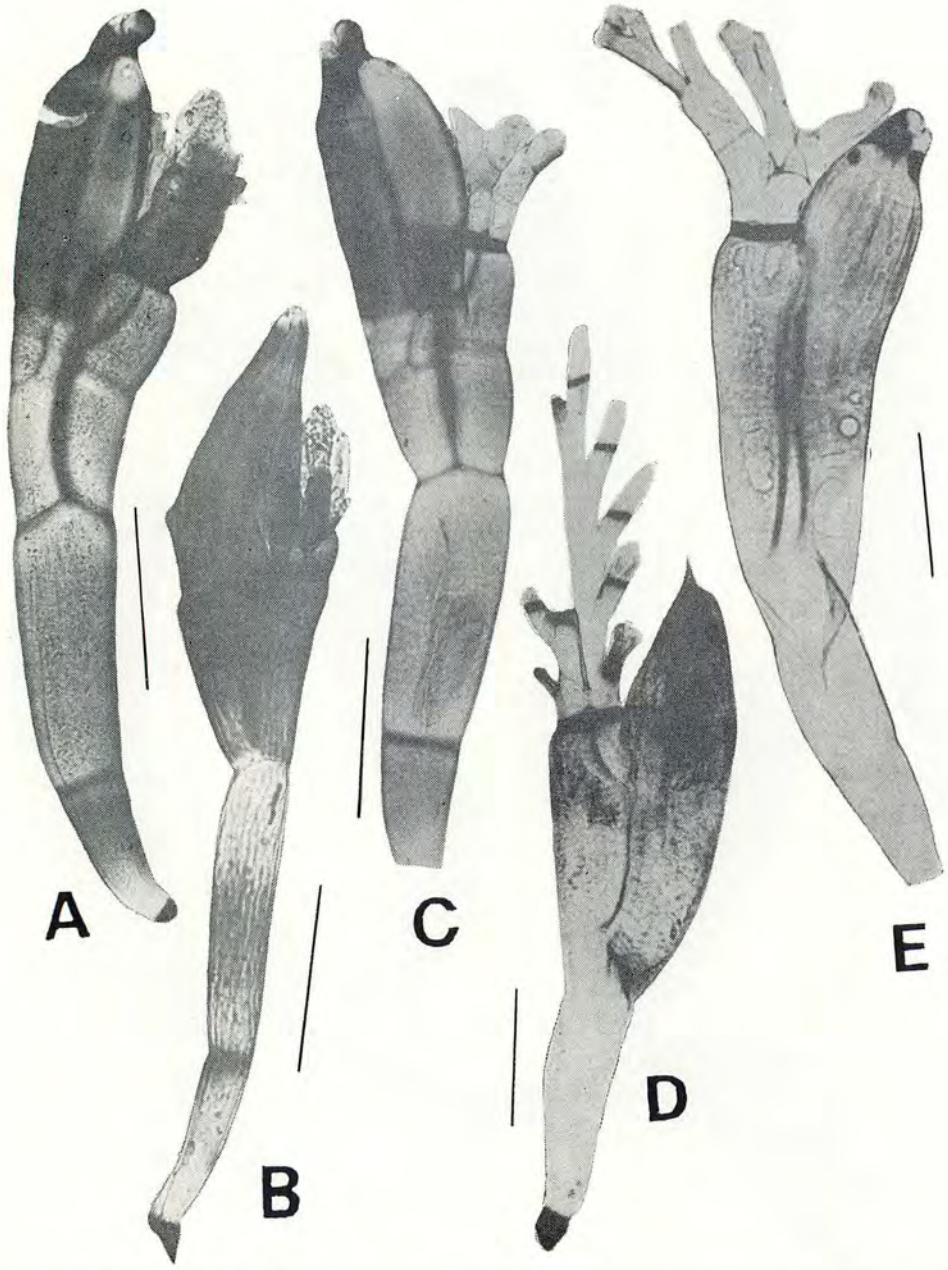


Figure 7. A and C : *Laboulbenia catascopi* Thaxter. B : *Laboulbenia tachys* Thaxter. D : *Laboulbenia pheropsophi* Thaxter. *E : Laboulbenia morionis* Thaxter. Scales : A, C and D : 100 μm. B and E : 50 μm.

Thallus hyaline, yellowish, partly blackish, consisting of a receptacle, several perithecia, a few compound antheridia and many appendages. Receptacle cylindrical, simple, isodiametric, consisting of 14–16 superimposed one-cell layers which compose the basal middle and distal portions of receptacle, 320–600 μm long, 25–30 μm thick; the basal portion comprising two layers without any organs, forming basally a blackish foot; the middle portion composed of 6–7 layers, forming unilaterally 2–9 perithecia and one or two antheridia; the distal portion of receptacle including 6–8 layers, forming bilaterally and terminally 13–16 appendages, usually two in each layer. Perithecium concolorous with the receptacle, comprising a stalk and perithecium proper 185–202 μm long, 45–95 μm thick; the stalk unicellular, free laterally, gradually becoming thicker towards the base of perithecium proper, 25–68 μm long, 10–25 μm thick; the perithecium proper ellipsoidal, with relatively large basal cells, more or less projecting apically, forming a short thin projection besides the terminal pore, 115–270 μm long, 40–95 μm thick. Appendages simple, cylindrical, filamentous, composed of about five superposed cells with blackish septa, more or less constricted at the septa, 178–190 μm long, 18–20 μm thick. Compound antheridium horn-shaped, pointed terminally, 50–63 μm long, 23–33 μm thick.

Host genus : *Pheropsophus* (Carabidae).

Host species in Thailand : *Pheropsophus siamensis* Chaudoir.

Distribution : Africa, Madagascar, Ceylon, India, Thailand (new record), China and Japan.

Specimens examined : Bangkok, 23 May 1960, K-S-3367 and 3501.

The genus *Enathromyces* includes only the present species. This fungus is very unique in the characters of the receptacle, perithecium, antheridium and appendages and distinct from any species of the other genera. The specimens were found on the inferior surface of the elytral margin, mixed with *Laboulbenia pheropsophi* Thaxter.

18. *Laboulbenia anoplogenii* Thaxter, *Proc. Amer. Acad. Arts Sci* **35** : 156 (1899) et *Mem. Amer. Acad. Arts Sci.* **13** : 348 (1901. SUGIYAMA, *Ginkgoana* **2** : 42 (1973). (Fig 6, A & C)

Thallus hyaline, suffused with yellowish-brown, consisting of a receptacle and a perithecium. Total length to the top of perithecium 210–400 μm. The thickest portion of the thallus 62–87 μm. Receptacle comprising receptacle proper and distal two branches; 150–370 μm long, 25–52 μm thick; each layer one-celled except the fourth one; basal two layers forming the stalk of thallus; the stalk more or less curved posteriorly, thickest at the distal end, gradually tapering towards the basal blackish obconical foot; the first layer 45–77 μm long, 20–35 μm thick; the second layer more or less longer and thicker than the first; the third layer about twice as long as thick, 32–72 μm long, 20–35 μm thick; the fourth layer composed of two cells arranged

antero-posteriorly, 27–47 μm long, 25–35 μm thick; the distal end of the posterior cell more or less projecting obliquely upwards; the fifth layer blackish and opaque, flat, band-shaped in the lateral view, forming a constricted part of the receptacle, 5–7.5 μm long, 15–22 μm thick; distal branches of receptacle placed above the fifth layer of the basal portion of receptacle, arranged antero-posteriorly : anterior branch thinner and shorter, dichotomous, forming terminally antheridia : the posterior branch branched once or twice above the basal cell, sterile, exceeding 400 μm in length. Perithecium composed of a stalk and perithecium proper : the stalk consisting of a large basal cell and a few small distal cells, formed on the anterior side of the second layer of the receptacle proper, separated from it by an oblique septum, united to the third layer of receptacle proper in lateral side, 42–90 μm long, 20–40 μm thick; perithecium proper ellipsoidal, softly constricted and blackened at subapical portion, 87–130 μm long, 30–55 μm thick; apex asymmetrical. Antheridium bottle-shaped, 25–30 μm long.

Host genera : *Abacetus*, *Agonoderus*, *Anoplogenius*, *Stenolophus* etc.

Host species in Thailand : *Stenolophus (Egadroma) quinquepustulatus* Wiedemann.

Distribution : Madagascar, Ceylon, India, Thailand (new record), Formosa, Japan and U.S.A.

Specimens examined : Muak Lek, Thailand, March 23, 1982, K-S-3396 and 3399.

This species is characterized by the projecting distal corner of the fourth layer of receptacle, and the sterile long posterior branch of receptacle branched at lower position. However, the former character is not distinct in the specimens examined.

19. *Laboulbenia catascopi* Thaxter, *Proc. Amer. Acad. Arts Sci.* **28** : 164 (1893) et *Mem. Amer. Acad. Arts Sci.* **12** : 322 (1896). SUGIYAMA, *Trans. mycol. Soc. Japan* **13** : 262 (1972). (Fig. 7, A & C).

Thallus yellowish brown, consisting of a receptacle and a perithecium. Total length to the tip of perithecium 490–550 μm. Receptacle comprising the receptacle proper and two distal branches; the receptacle proper cylindrical, composed of five layers of cells, 380–390 μm long; each layer one-celled except the fourth layer; the first and second layers forming a stalk of the thallus; the stalk usually straight, thickest near the distal end, gradually tapering towards both the basal and distal end; the first layer short, often with tint of reddish brown, forming basally an obconical foot, 100–105 μm long, 45 μm thick; the second layer 150–160 μm long, 65 μm thick; the distal end of this layer projecting at middle portion; the third layer more or less constricted basally, 90–95 μm long, 37–45 μm thick; the fourth layer comprising two cells arranged antero-posteriorly, thickest at the distal end, 55–60 μm long, 42–65 μm thick : the posterior cell larger, concave at the anterior distal corner to receive the smaller anterior

cell; the fifth layer blackish, opaque, flat, forming a constricted part of the receptacle, 7.5 μm long, 25–35 μm thick; the distal two branches of receptacle arranged antero-posterioly above the fifth layer of the receptacle proper, hyaline, filamentous, subdichotomous, sterile in mature plants, 150–160 μm long; the basal cells of the branches more or less constricted at both basal and distal ends. Perithecium darker than the receptacle, consisting of a stalk and perithecium proper, the stalk consisting of a large basal and a few distal cells, formed on the distal end of the second layer of receptacle proper, united to the third layer and the basal half of the fourth layers of the receptacle on lateral side, 95–120 μm long, 45–85 μm thick; perithecium proper ellipsoidal, softly constricted and blackened at subapical portion, free from the receptacle except small basal part which is united to the anterior cell of the fourth layer of the receptacle 160–200 μm long, 70–75 μm thick; the posterior lip-cell more prominent than the anterior.

Host genus : *Catascopus* (Carabidae).

Host species in Thailand : *Catascopus fuscoaeneus* Chaudoir.

Distribution : Costa Rica, Guatemala, Mexico, Panama, Bengal, Thailand (new record) and the Philippines etc.

Specimen examined : Trang Province, Thailand, September 8, 1969, K-S-3502.

The main character of this species the asymmetrical tip of the perithecium and and the basal cell of the posterior branch of receptacle which is constricted both the basal and distal ends. The specimen examined was found on the right foreleg of the hosts.

20. Laboulbenia celestialis Thaxter, *Proc. Amer. Acad. Arts Sci.* **35** : 163 (1899) et *Mem. Amer. Acad. Arts Sci.* **13** : 361 (1908). Fig. 6, B).

Total length to the tip of perithecium 260–315 μm. The thickest portion 85–87 μm. Receptacle hyaline, suffused with brown consisting of receptacle proper and two branches; receptacle proper short and stout, composed of five layers of distal cells, 135–190 μm long; each layer one-celled except the fourth; the lower two layers forming the stalk of the thallus; the first layer obconical, tapering towards the basal blackish foot, inflated above the foot, 47–52 μm long, 35–37 μm thick; the second layer stout, 40–50 μm long, 50–60 μm thick; the anterior half of the distal end depressed by the upper layer; the third layer darker than the lower layers, 32–37 μm long, 35–40 μm thick; the fourth layer composed of two cells arranged antero-posteriorly 32–35 μm long, 40–47 μm thick; the anterior cell smaller than the posterior, placed at the distal corner of the latter; the fifth layer blackish and opaque, flat, band-shaped in the lateral view, forming a constricted part of the receptacle, 7.5–10 μm long, 25–27 μm thick; distal two branches arranged antero-posteriorly, branched into many simple branchlets

at the lower portion, 102 μm long, 80 μm thick. Perithecium ellipsoidal, comprising a stalk and perithecium proper; the stalk composed of a large basal and a few distal cells, formed on the anterior half of the distal end of the second layer of the receptacle, united to the third and the fourth layers of the receptacle laterally 55–60 μm long, 42–47 μm thick; perithecium proper hyaline at basal one-third, suffused with brown on the remaining distal portion, broadly rounded at the apex, 130–160 μm long, 60–67 μm thick.

Host genera ; *Desera, Dichrananoncus* and *Drypta* (Carabidae).
Host species in Thailand : *Desera geniculata* Klug.
Distribution : Africa, Thailand (new record), China and Japan.
Specimen examined : Chiang Mai, Thailand, October 23, 1960, K-S-3500.

The Present species is characterised by the bicoloured perithecium and the branch of receptacle which consists of a basal cell and 3–5 simple branchlets with blackish septa. Similar branches are found in *L. asiatica* Thaxter but *L. celestialis* is distinguished from *L. asiatica* by its bicoloured perithecium.

21. Laboulbenia idiostoma Thaxter, *Proc. Amer. Acad. Arts Sci.* **50** : 28 (1914). (Fig. 5, D).

Thallus hyaline, greenish-brown, consisting of a receptacle and a perithecium. Total length to the tip of perithecium 127–157 μm. The thickest portion 27–47 μm. Receptacle composed of receptacle proper and two distal branches; receptacle proper cylindrical, short and stout, comprising five layers of cells; each layer one-celled except the fourth : the first and second layers forming a stalk of the thallus; the first layer hyaline, thickest at the distal end, gradually tapering towards the basal foot 22–32 μm long, 15–17 μm thick; the second layer darker than the first, convex at distal end, 10–15 long, 17–20 μm thick; the third layer placed on the posterior half of the distal μm end of the second layer, stout, 10–15 μm long, 12–15 μm thick; the fourth layer composed of two roundish cells arranged antero-posteriorly, 12–15 μm long; 15–20 μm thick; the posterior cell larger than the anterior; the fifth layer blackish, flat, thin, forming a constricted part of the receptacle, 3.8–5 μm long, 8.8–11.3 μm thick; the distal two branches of receptacle placed above the fifth layer, arranged antero-posteriorly, curved anteriorly at basal portion to cross with the basal or middle part of the perithecium; the anterior branch shorter, branched into a few branchlets arranged antero-posteriorly, the anterior branchlet short and dichotomous, forming terminally antheridia, the posterior two branchlets simple, long, sterile; the posterior branch of receptacle simple or forming two simple branchlets of unequal length above the basal cell, the longer branchlet constricted with a blackish septum at the base, 225–290 μm long. Perithecium consisting of a stalk and perithecium proper; the stalk hyaline, short, formed on the distal end of the second layer of receptacle, separated from it by an oblique septum,

united to the third and fourth layers on lateral side, 15–17 μm long, 12–18 μm thick; perithecium proper darkly suffused with blackish-brown except the tip, thickest near the base, tapering towards the distal end, free from the receptacle laterally, forming apically a pair of short hyaline projections with round tips, 87–117 μm long, 27–40 μm thick. Antheridium brownish, darker than the cells below, 30–37 μm long.

Host genus : *Altica (= Haltica)* (Chrysomelidae).

Host species in Thailand : *Altica* sp.

Distribution : Borneo, Thailand (new record), Formosa, Japan and Hyti.

Specimens examined : Bangkok, Thailand, March 17, 1982, K-S-3478. Saraburi, Thailand, March 25, 1982, K-S-3379.

The main characters of the present species are the short receptacle proper, the receptacle branches bent posteriorly to cross the perithecium and the dark, conical perithecium with apicalprojections. *L. antarctiae* Spegazzini has similar perithecial projections but is readily distinguished from the present species in the other characteristics. The specimens were found on the antennae and the forelegs.

22. Laboulbenia kunckelii (Giard) Thaxter, *Proc. Amer. Acad. Arts Sci.* **30** : 471 (1895) et *Mem. Amer. Acad. Arts. Sci.* **12** : 336 (1896). (Fig. 8, B)

Thaxteria kunckalii Giard, *Comptes rendus hebdom. Séances Soc. Biol., Paris, Sér.* **9** : 156 (1892).

Total length to the top of perithecium 2250 μm. The thickest part 135 μm. Thallus extremely large, long, hyaline, partly blackish, often irregularly curved, consisting of a receptacle and a perithecium. Receptacle composed of receptacle proper and distal two branches; receptacle proper cylindrical, comprising five layers of cells, 1525 μm long : each layer one-celled except the fourth; the lower three layers included in blackish suffusion; the first layer forming basally an obconical foot, 250 μm long, 65 μm thick; the second layer 320 μm long, 55 μm thick; the third layer 370μ m long, 105 μm thick; the fourth layer consisting of a longer cell and a shorter cell, the latter placed at the posterior side of the distal end of the former, 650 μm long, 110 μm thick; the fifth layer blackish, short and thin, forming a constricted part of the receptacle, 50 μm long, 80 μm thick : the distal two branches of receptacle placed antero-posteriorly above the fifth layer of the receptacle proper; the anterior branch consisting of a basal cell and a few blackish monopodial branchlets above it, not exceeding the tip of the perithecium; the posterior branch similar to the anterior; the distal portion of the brachlets often hyaline. Perithecium consisting of a stalk and perithecium proper; the stalk formed on the second layer of the receptacle, united to the third and fourth layers on lateral side : the perithecium proper cylindrical, rounded terminally, free from the receptacle on lateral side, 650 μm long, 80 μm thick; the basal half hyaline, sterile; the distal half blackish-brown, containing the ascigerous cells. Antheridium not observed.

Host genus : *Mormolyce* (Carabidae)·

Host species in Thailand : *Mormolice phyllodes phyllodes* Hagenbach.

Distribution : Peninsular Malaysia and Thailand (new record).

Specimen examined : Satun Province, Thailand, May 15, 1967, K-S-3425.

The gigantic thallus, the monopodial branches of the receptacle and the long perithecium with a long sterile basal portion are the main features of this species. This species is similar to *L. parmella* Thaxter from which *L. kunckelii* can be distinguished by the longer and less suffused receptacle.

23. Laboulbenia morionis Thaxter, *Proc. Amer. Acad. Arts Sci.* **28** : 169 (1983) et *Mem. Amer. Acad. Arts Sci.* **12** : 341 (1896) et **13** : 409 (1908). (Fig. 7, E)

Thallus hyaline, yellowish, partly suffused with brown, consisting of a receptacle and a perithecium. Total length to the tip of perithecium 280–290 μm. Receptacle comprising a receptacle proper and distal two branches; receptacle proper cylindrical, composed of five layers of cells, 245–275 μm long; each layer one-celled except for the fourth; the first and second layers forming stalk of thallus; the stalk usually straight. thickest at the distal end, gently tapering towards the basal blackish obconical foot; the first layer 62–70 μm long, 30 μm thick; the second layer 70–87 μm long, 35–40 μm thick, the anterior half of the distal end obliquely depressed; the third layer distinctly darker than the stalk portion, 55–62 μm long, 30–32 μm thick; the fourth layer comprising two cells arranged antero-posteriorly with the smaller cell on the anterior side, 52–65 μm long, 32–37 μm thick; the fifth layer blackish, flat, thin, forming the constricted part of the receptacle, 6.3–7.5 μm long, 27 μm thick; the distal two branches of receptacle arranged antero-posteriorly above the fifth layer of receptacle, hyaline, subdichotomous usually sterile in mature plants, 90–115 μm long; the anterior branch consisting of a relatively large basal cell and two branchlets above it which seem to be arranged right and left; the basal cell of the posterior branch about twice as long as that of the anterior. Perithecium concolorous with the receptacle, comprising a stalk and a perithecium proper; the stalk composed of a large basal cell and a few smaller distal cells formed on the distal end of the receptacle proper, united to the third layer on lateral side, 52–80 μm long, 27–35 μm thick; perithecium proper ellipsoidal, adnate to the fourth layer of receptacle on the lateral side of basal half, 112–132 μm long, 35–47 μm thick; apex blackened and projecting, hyaline around the pore; the anterior lip-cell more or less shorter than the posterior.

Host genera : *Morion, Moriosomus* and *Platynodes.*

Host species in Thailand : *Morion* sp.

Distributlon : Argentina, Brazil, Peru, Mexico, New Guinea, Java and Thailand (new record).

Specimen examined : Searites Subteraneus, Thailand, December 27, 1962, K-S-3490.

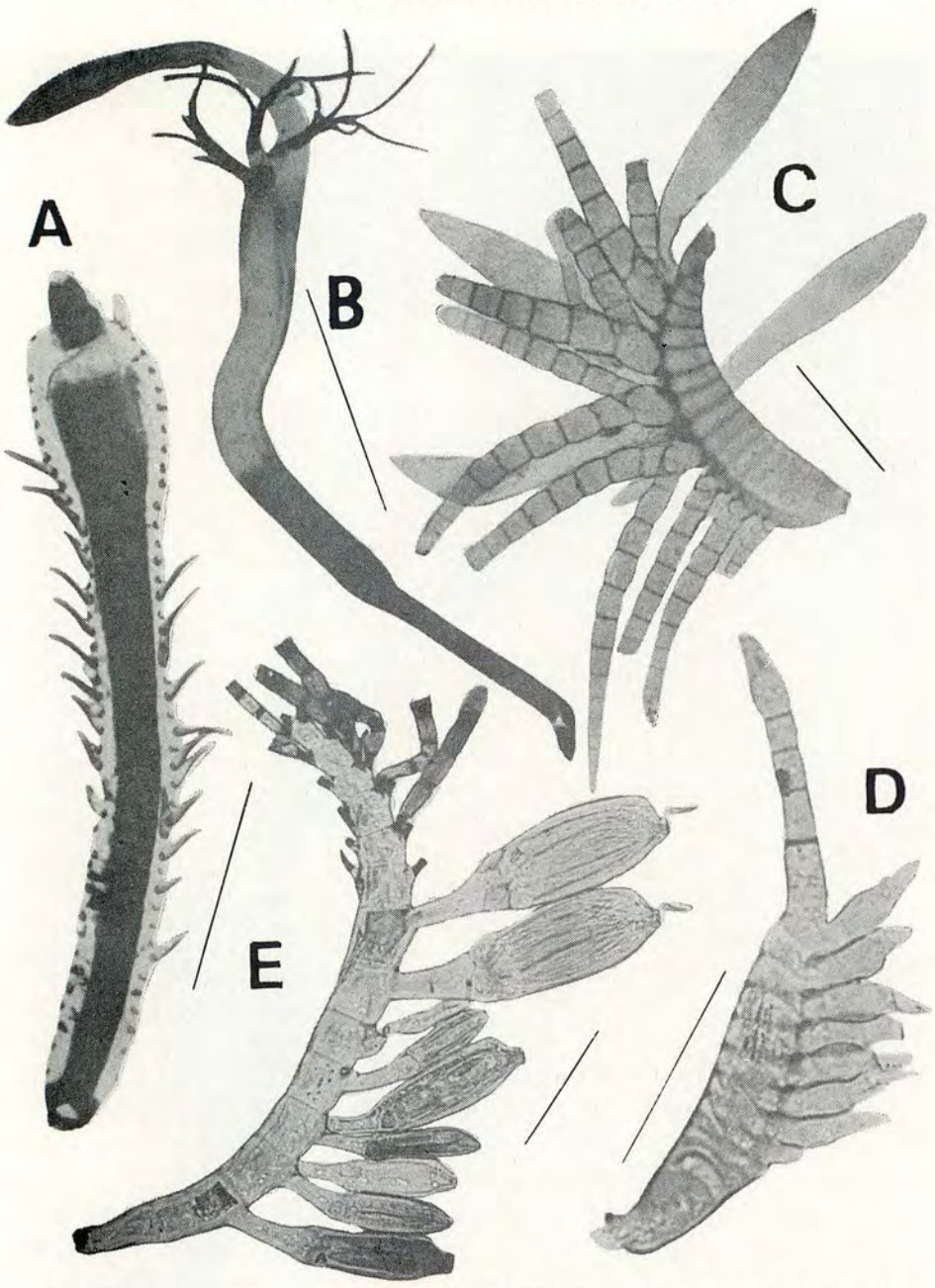


Figure 8. A : *Rickia eumorphi* Thaxter. B : *Laboulbenia kunckelii* (Giard) Thaxter. C : The female thallus of *Dimeromyces cherrhonesites* Balazuc. D : The male thallus of *Dimeromyces cherrhonesites* Balazuc. E. *Enathromyces indicus* Thaxter. Scales : A, C and E : 100 μm. B : 500 μm. D : 50 μm.

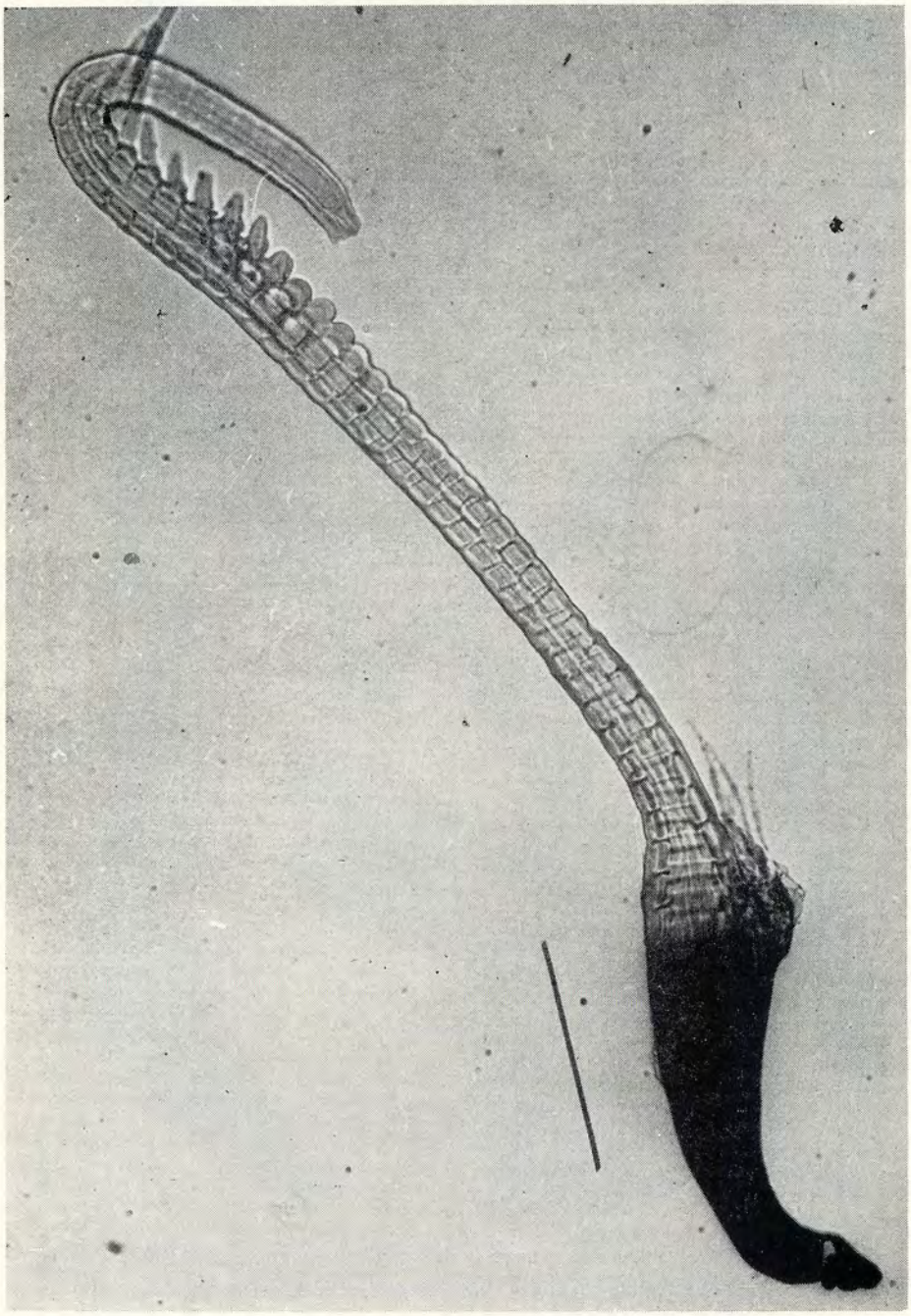


Figure 9. *Rhinchophoromyces denticulatus* Thaxter. Scale : 100 μm.

The present species is characterized by the anterior cell of the fourth layer of receptacle projecting between the fifth layer and perithecium. However, in the specimens collected in Thailand, the cell is not proliferated. The authors decided them as *L. morionis* by the relatively high position of the fifth layer united to the perithecium at about middle height of the latter organ. The specimens were found on the left foreleg and the elytra.

24. Laboulbenia pheropsophi Thaxter, *Proc. Amer. Acad. Arts Sci.* **28** : 170 (1893) et *Mem. Amer. Acad. Arts Sci.* **13** : 401 (1908). SUGIYAMA, *Ginkgoana* **2** : 59 (1973). (Fig. 7, D).

Thallus hyaline, suffused with yellowish-brown, consisting of a receptacle and a perithecium. Total length to the tip of perithecium 270–510 μm. Receptacle comprising receptacle proper and distal two branches; receptacle proper cylindrical, composed of five superimposed layers of cells, 220–350 μm long; each layer one-celled except the fourth one; the first and second layers forming a stalk of thallus; the stalk usually straight, thickest at the distal end, gradually tapering towards the basal blackish obconical foot; the first layer 70–120 μm long, 25–35 μm thick; the second layer 65–100 μm long, 35–50 μm thick; the upper layers darker than the first and second layers; the third layer 45–80 μm long, 35–50 μm thick; the fourth layer composed of two cells arranged anterio-posteriorly, 50–60 μm long, 40–50 μm thick; the posterior cell larger, supporting the smaller anterior cell on the concave distal corner; the fifth layer blackish, opaque, flat, band-shaped when viewed laterally; the distal two branches of receptacle arranged antero-posteriorly above the fifth layer of receptacle, 450–460 μm long : the posterior branch monopodial, consisting of a main axis and many lateral branchlets; the main axis cylindrical, filamentous, usually simple, composed of 8–10 cells; each cell forming unilaterally a short simple branchlet near the distal end; the branchlet composed of two cells separated from each other by a blackish septum; the anterior branch of receptacle similar to the posterior, often forming a short dichotomous antheridial branchlet with terminal antheridia. Perithecium hyaline, more darkly suffused with brown than the receptacle, consisting of a stalk and perithecium proper; the stalk composed of a large basal cell and a few small distal cells, formed above the second layer of receptacle, adnate laterally to the third and fourth layers, 70–110 μm long, 40–55 μm thick; perithecium proper ellipsoidal, united laterally to the upper half of the fourth layer of receptacle, free from the cells of receptacle in the upper four-fifths, suddenly becoming thinner above the subapical portion, blackened apically except around the terminal pore, 130–210 μm long, 35–75 μm thick. Antheridium brownish, bottle-shaped, 70–90 μm long.

Host genus : *Pheropsophus* (Carabidae).

Host species in Thailand : *Pheropsophus siamensis* Chaudoir.

Distribution : Cosmopolitan.

Specimens examined : Bangkok, Thailand, May 23, 1960, K-S-3367 and 3499.

This fungus species is characterized by the monopodial branching of the receptacle branches, and resembles *L. texana* Thaxter and *L. pachytelis* Thaxter in this respect. However, *L. pheropsopsi* is distinguished from these by the slenderer main axis of the receptacle branch.

25. Laboulbenia proliferans Thaxter, *Proc. Amer. Acad. Arts Sci.* **28** : 168 (1893) et *Mem. Amer. Acad. Arts Sci.* **12** : 348 (1896) et **13** : 331 (1908). SUGIYAMA, *Ginkgoana* **2** : 60 (1973). (Fig. 4, C).

Total length to the tip of perithecium 660–860 μm. The thickest portion of thallus 85–130 μm. Thallus hyaline, amber-brown, nearly straight, composed of a receptaele and a perithecium. Receptacle comprising receptacle proper and two distal branches; receptacle proper cylindrical, slender, composed of five layers of cells, 480–620, 45–75 μm thick; each layer one-celled except the fourth; the lower two layers forming a stalk of the thallus; the first layer suffused darker than the upper layers, forming a blackish obconical foot at the base, 170–210 μm long, 45–65 μm thick; the second layer 160–246 μm long, 45–70 μm thick, the anterior half of the distal end depressed by the upper layer; the third layer 80–35 μn thick; the fourth layer primarily composed of two cells arranged antero-posteriorly with the smaller anterior cell placed on the distal corner of the posterior one, 60–70 μm long. 30–60 μm thick; the anterior cell proliferated in age into several cells arranged side by side and projecting obliquely upwards between the fifth layer and the perithecium forming a conical projection; the fifth layer blackish, thin, forming the narrowest part of the receptacle proper, 10 μm long, 17–25 μm thick; the distal two branches of receptacle placed antero-posteriorly above the fifth layer of receptacle, hyaline, filamentous, subdichotomous; filamentous appendages formed on the distal end of a few proliferated cells of the fourth layer of receptacle, similar to the branches of receptacle. Perithecium concolorous with the receptacle, often darker; comprising a stalk and perithecium proper; the stalk composed of large lower and smaller upper cells, formed on the distal end of the second layer of receptacle, adnate to the third and fourth layer on lateral side, 160–195 μm long, 55–90 μm thick; the perithecium proper cylindrical, suddenly becoming thinner above the subapical portion, thinly rounded terminally, blackened at subapical portion, wholly free from the cells of receptacle laterally, 180–285 μm long, 55–85 μm thick; lip-cells symmetrical.

Host genera : *Brachionychus*, *Chlaenius*, *Craspedophorus*, *Eudema*, *Pheropsophus*, *Rhembus*, *Rhopalomerus* etc. (Carabidae).

Host species in Thailand : *Chlaenius ducalis* Chaudoir.

Distribution : Europe, Africa, Ceylon, India, Thailand (new record), Java and Japan.

Specimen examined : Khon Kaen, Thailand, August 19, 1971, K-S-3496.

The main feature of the present species is the fourth layer of the receptacle projecting between the fifth layer and the perithecium and proliferating into several cells with filamentous appendages. The same character is found in *L. okumurai* Sugiyama, though this species is distinguished from *L. proliferans* by the blackish branches of the receptacle.

26. Laboulbenia tachys Thaxter, *Proc. Amer. Acad. Arts Sci.* **38** : 38 (1902) et *Mem. Amer. Acad. Arts Sci.* **13** : 360 (1908). SUGIYAMA, *Ginkgoana* **2** : 65 (1973). (Fig. 7, B).

Total length to the tip of perithecium 277 μm. The thickest portion of thallus 52 μm. Receptacle hyaline cylindrical, with tint of pale greenish brown, consisting of receptacle proper and distal two branches; the receptacle proper long and slender, composed of five layers of cells, 205 μm long; each layer one-celled except the fourth; the first and second layers forming a stalk of the plant; the first layer thickest at the distal end, gradually tapering towards the basal blackish obconical foot, 61 μm long, 15 μm thick; the second layer isodiametric, 85 μm long, 20 μm thick; the third layer darker than the lower layers, 40 μm long, 17 μm thick; the fourth layer consisting of two cells arranged antero-posteriorly, 15 μm long, 20 μm thick; the cells of about equal length with the anterior one thinner; the fifth layer blackish, flat, thin, band-shaped in lateral view, 5 μm long, 20 μm thick; the distal two branches of receptacle arranged antero-posteriorly on the fifth layer, consisting of a basal cell and filamentous subdichotomous branchlets, 50 μm long; the basal cell of the posterior branch projecting obliquely upwards forming a conical prominence; the upper septum of this cell blackened and forming a bristle-like projection at the posterior side. Perithecium comprising a stalk and perithecium proper; the stalk composed of a large basal cell and two subbasal ones arranged antero-posteriorly, formed on the distal end of the second layer of receptacle, adnate to the third layer in the posterior side; perithecium proper concolorous with the receptacle, not blackened at subapical portion, thickest at about two-fifths in height, more or less straightly tapering towards both the basal and distal ends at the anterior side, forming a transverse ridge at the thickest portion, united to the fourth and fifth layers of receptacle on the posterior side, free from receptacle at distal four-fifths portion, 88 μm long, 38 μm thick; the apex coarsely rounded.

Host genus : *Tachys* (Carabidae).

Host species in Thailand : *Tachys* (*Tachyura*) *poecilopserus* Bates.

Distribution : Europe, Thailand (new record), Japan, Korea, U.S.A. and Argentina.

The present species is characterized by the projecting basal cell of the posterior branch of the receptacle and the subapical portion of perithecium which is not blackened. The former character distinguishes the present species from the allied *L. pedicellata*.

27. *Rhynchophoromyces denticulatus* (Thaxter) Thaxter, *Mem. Amer. Acad. Arts Sci.* **13** : 433 (1902). (Fig. 9).

Ceratomyces denticulatus Thaxter, *Proc. Amer. Acad. Arts. Sci.* **35** : 445 (1900).

Thallus hyaline, partly brownish, consisting of a receptacle, a perithecium and numerous appendages, 423–668 μm long, 35–40 μm thick. Receptacle cylindrical, composed of the basal, middle and distal portions; the basal portion forming a stalk of thallus, comprising about 10 superimposed one-cell layers, gradually tapering towards the basal end, more or less curved posteriorly, forming basally a blackish obconical foot, 100–163 μm long, 35–40 μm thick; the basal layer longest 25–30 μm long; the middle portion of receptacle forming the inflating part of the receptacle, subellipsoidal, consisting of many cells arranged in rather irregular order, suffused with brown; the distal portion of receptacle paler than the middle portion, consisting of 2–3 large cells bearing numerous filamentous appendages: the appendage exceeding the perithecial apex. Perithecium cylindrical, extremely long, formed on the lateral side of the middle portion of receptacle, consisting of basal and distal portions, 323–505 μm long, 35–40 μm thick; the basal portion ellipsoidal, almost wholly suffused with brown, consisting of a number of wall-cells; the distal portion of perithecium paler than the basal one, almost isodiametric, more or less tapering upwards at distal portion, strongly curved downwards at subapical portion, composed of about 50 superimposed layers of cells with each layer consisting of four cells arranged in a transverse series, forming 8–10 cellular tooth-like projections at the posterior side of subapical portion with one in a layer, 300–480 μm long.

Host genus : *Helochares* (Hydrophilidae).

Host species in Thailand: *Helochares pallens* (MacLeay).

Distribution: France, Sumatra and Thailand (new record).

Specimens examined: Saraburi, Thailand, March 25, 1982, K-S-3443; the same locality, March 26, 1982, K-S-3376 and 3405.

This fungus species is characterized by the slender thallus and the extremely elongate perithecium with tooth-like projections. Such characters are in common with *R. elephantinus* Thaxter. However, the present species is distinct from *R. elephantinus* by the larger number of the perithecial projections. The specimens examined were found on the inferior surface of abdomen and on the femur of fore- and hind-legs.

28. Rhynchophoromyces rostratus (Thaxter) Thaxter, *Mem. Amer. Acad. Arts Sci.* **13** : 433 (1908) et **16** : 337 (1931). (Fig. 10)

Ceratomyces rostratus Thaxter, *Proc. Amer. Acad. Arts Sci.* **28**: 188 (1893).

Thallus hyaline, suffused with brown, becoming darker in age, composed of a receptacle and a perithecium, 350–630 μm long, 33–60 μm thick. Receptacle cylindrical, consisting of basal, middle and distal portions, 158–283 μm long, 35–45 μm thick; the basal portion slender, forming a stalk of thallus, comprising 8–10 superimposed one-cell layers, gradually tapering towards the basal end, more or less curved posteriorly; the first layer longest, forming basally a blackish foot, 23–33 μm long, 18–23 μm thick; the middle portion of receptacle darker than the basal and distal portions, consisting of a number of cells arranged in roughly 5–10 layers; the distal portion of receptacle consisting of 2–3 cells bearing numerous simple filamentous appendages; the appendages 93–155 μm long, 1–2 μm thick. Perithecium cylindrical, extremely elongate, consisting of numerous layers of wall-cells, roughly divided into the basal and distal portions, 300–600 μm long. 33–60 μm thick; the basal portion composed of cells arranged rather irregularly, adnate to the middle portion of receptacle, difficult to distinguish from it, wholly suffused with brown; the distal portion of perithecium paler than the basal portion, cylindrical, very gradually tapering towards the thinly rounded termination, often curved downwards at about middle portion, consisting of about 40 superimposed layers of cells, forming terminally a small papillate prominence.

Host genera : *Enochrus* and *Helochares* (Hydrophilidae).

Host species in Thailand : *Enochrus* (*Lumetus*) *esuriens* (Walker), *E. parvulus* Kuwert and *Helochares pallens* (MacLeay).

Distribution : Italy, North America, Haiti and Thailand (new record).

Specimens examined : Saraburi, Thailand, March 24, 1982, K-S-3391, 3392, 3397, 3400, 3408, 3409, 3411, 3412 and 3415.

The present species is one of the representative types of the genus and similar to *R. amphiopsis* Thaxter, *R. elephantinus* Thaxter, *R. denticulatus* Thaxter and *R. minor* Thaxter in general appearance. However, *R. rostratus* is distinguished from *R. amphiopsis* by the lesser number of layers of the basal portion of receptacle and from *R. denticulatus* and *R. elephantinus* by the lack of the perithecial tooth-like projections. On the other hand, it is distinguished from *R. minor* in having a larger thallus and greater number of layers in the basal portion of the receptacle. According to Thaxter, the antheridia of this genus are of the exogenous type, though the present authors could not see them in any species of this genus collected in Thailand. The specimens were found on the inferior surface of the abdominal margin.

29. Rickia eumorphi Thaxter, *Proc. Amer. Acad. Arts Sci.* **52** : 42 (1916) et *Mem. Amer. Acad. Arts Sci.* 15 : 470 (1926). SUGIYAMA & MOCHIZUKA, *Trans. mycol. Soc. Japan* **20** : 352 (1979). (Fig. 8, A).

Thallus hyaline, partly blackish, slenderly leaf-like, widest at subapical portion, gradually tapering towards the basal end, 305–455 μm long, 37–53 μm wide. Receptacle simple, consisting of basal and distal portions; the basal portion comprising a stalk-like basal cell and (probably) two subbasal cells arranged antero-posteriorly; the basal cell hyaline, forming basally a relatively large roundish foot; the subbasal cells blackish; the distal portion of receptacle consisting of three longitudinal series of cells, the anterior, median and posterior series; the median series concealed in a blackish suffusion; the the anterior and posterior series hyaline but concealed in the blackish zone continuous with that of the median series at about half of the inner side; the anterior series composed of 50–60 cells; each series forming a few basal cells of the antheridia or appendages at the outer margin; the posterior series similar to the anterior but shorter, terminated with short projecrtion (primary appendage). Antheridia bottle-shaped, brownish, separated with the basal cell with thin blackish septum, 12–20 μm long. 3–4 μm thick. Appendages similar to the antheridia, paler, inflated at the distal end. Perithecium brownish, opaque, with subapical-transverse hyaline part, ovoid to obclavate, with a dome-shaped termination, adnate to the distal cells of the anterior and posterior series of receptacle except the apex, 95–118 μm long, 18–24 μm thick.

Host genus : *Eumorphus* (Endomychidae).

Host species in Thailand : *Eumorphus turritus* Gerstaecker and *E. tetraspilotushope*.

Distribution : Peninsular Malaysia, Thailand (new record) and the Philippines.

Specimen examined : Khao Chong, Trang, Thailand, January, K-S-3497; Phrae, Thailand, May 20, 1960, K-S-3498.

The present fungus species is characterized by the quite opaque median series of cells of the receptacle. A similar receptacle is found in *R. berlesiana* (Baccarini) Paoli. However *R. eumorphi* is distinct from *R. berlesiana* by the perithecium laterally adnate to the cells of both the anterior and posterior series of cells of receptacle except the apex. The specimens were found on indefinite parts of the body, most densely on elytral margins.

30. Zodiomyces subseriatus Thaxter, *Mem. Amer. Acad. Arts Sci.* **16** : 331 (1931). SUGIYAMA, *Trans. mycol. Soc. Japan* **22** : 317 (1981). (Fig. 11).

Thallus hyaline, yellowish, polyp-shaped, consisting of a receptacle, several perithecia and numerous appendages. Total length to the top of the receptacle 470 μm with the thickest portion 230 μm. Receptacle composed of stalk-like and disk-like

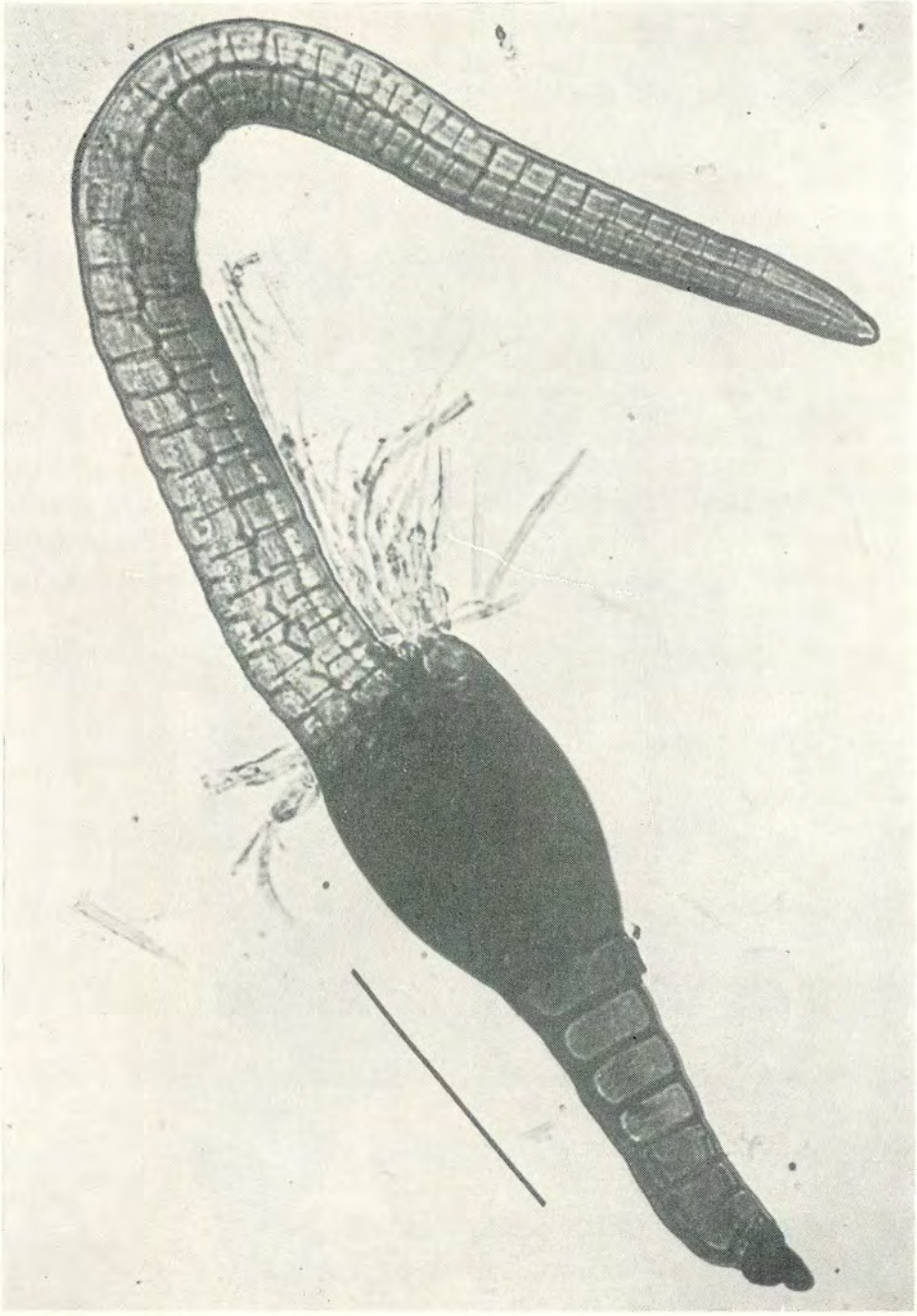


Figure 10. *Rhinchophoromyces rostratus* Thaxter. Scale : 100 μm.

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